DOE/EH-0531 (98Q4)

August 1999

DOE PERFORMANCE INDICATORS

ENVIRONMENT, SAFETY & HEALTH

Period Ending December 1998

DOE Office of Environment, Safety and Health
DOE Office of Operating Experience Analysis
http://tis.eh.doe.gov/oeaf/

Photo on Cover:

Idaho National Engineering and Environment Laboratory's Radioactive Waste Management Complex. The mission of the facility is to manage, in a safe and environmentally sound manner, the disposal of low-level radioactive waste and the storage of transuranic (activity greater than 100 nanocuries/gram) radioactive waste. About 40,000 cubic feet of low-level radioactive waste are disposed at the facility each year.

Table of Contents

This page is intentionally blank.

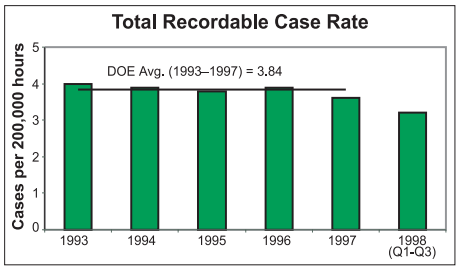
Introduction

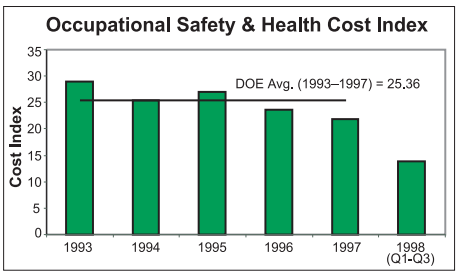
Trends

This report includes data through the end of calendar year 1998. As we look back over the past several years, we see the following trends:

Worker Health (Improvement)

The incidence of worker occupational illnesses and injuries has generally improved over the past years as evidenced by a reduced Total Recordable Case (TRC) rate and reduced DOE Cost Index. Since 1997, the overall number of injuries and illnesses recorded by contractors has declined approximately 13 percent while the hours worked decreased by approximately 2 percent, indicating the TRC rate shows a real safety performance improvement. Further, this positive decreasing trend has been ongoing since 1993.

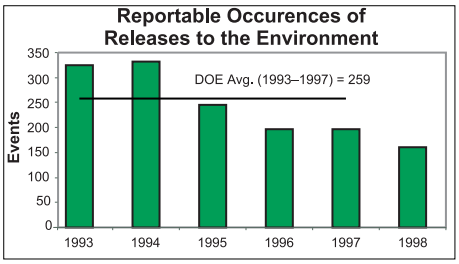


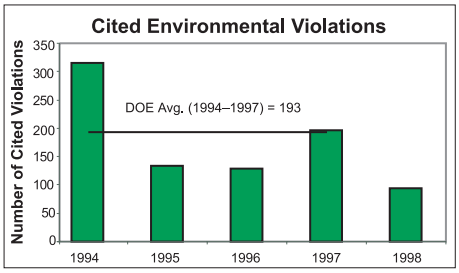


The decrease in the 1998 cost index reflects marked decreases (10% to 60%) in each of the cost index components from 1997 data; for example, fatalities were 50% less, transfers and terminations were 61% less, and days away from work were 54% less than in 1997.

Environmental (Improvement)

A favorable trend continues to exist through the time period 1993 – 1998, with the lowest number of annual reported releases to the environment occurring in 1998 (160). The number of releases has remained substantially below the DOE average of 259 events (1993 –1997). Further, favorable performance was also noted for cited environmental violations in 1998 (94) when compared to 1997 (196). 1998 had the lowest number of recorded violations since 1994 (315).

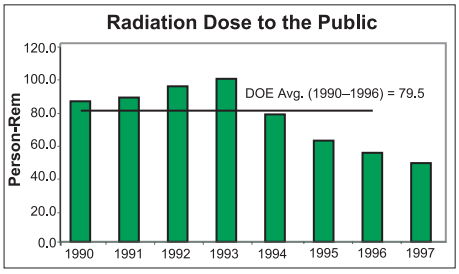


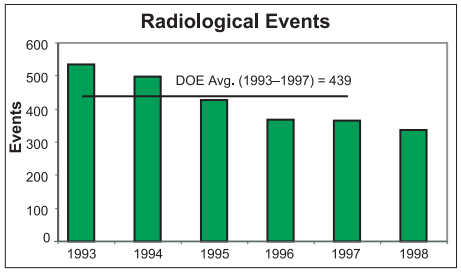


Radiological Health (Improvement)

The total collective radiation dose to the Public continues to decrease from a high value in 1993 of 98.4 person-rem to the 1997 value of 47.4 person-rem. In contrast, the average measurable dose to DOE workers remained constant (73 millirem per individual) when compared to 1997 and was approximately equal to the DOE annual average of 75.6 millirem per individual over the time period 1990 – 1997. The number of radiological contamination events experienced by workers continues to remain below the DOE average of 439 events (1993 –1997). The number of events has been

decreasing since 1993, though partly influenced by a change in reporting criteria when DOE Order 232.1 was revised in the fourth quarter of 1995. Still, 1998 (336) is the lowest recorded annual total of radiological contamination events since the inception of this report.

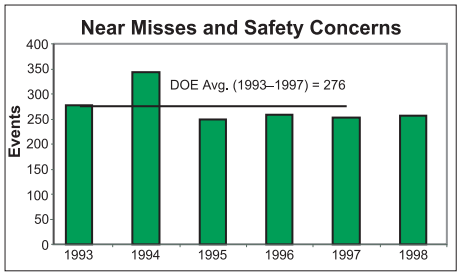




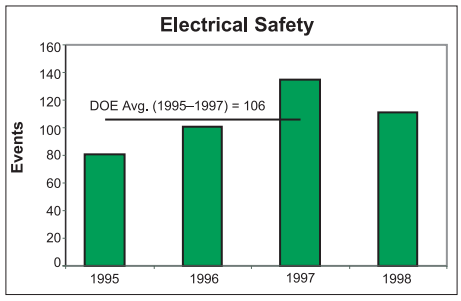
Occupational Safety (No Improvement)

This area may require management attention due to the number and significance of the events. The root causes for many of these events continue to involve management and personnel issues. As Integrated Safety Management policies, practices, and procedures become more widely implemented, we expect to see improvement.

When viewed together, the performance indicators chosen for this area illustrate little or no improvement in worker safety. Though recorded Near Misses and Safety Concerns have remained fairly stable since the end of 1994, these events can be viewed as precursors that indicate an increased likelihood of an accident/adverse event occurring. This fact conveys a message that perhaps there have been too few, or inadequate, process changes made to address these instances over the past four years.

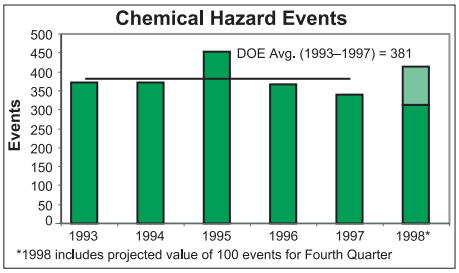


This observation is somewhat confirmed by the high number of electrical safety and industrial operations events that occurred in 1997 and 1998. For electrical safety, the number of events decreased in 1998 but remained above the DOE average. Further, the relative significance level (as defined in Table 1, appendix B of this report) of electrical safety events has increased slightly from 1997 to 1998. Industrial operations events for 1998 continue to remain above the DOE average of 116 and show almost no change from 1997.



Chemical hazard events also showed no improvement in 1998 and actually may be higher than 1997 after fourth quarter data (not yet available) is added to the 1998 annual total. A predicted value based on previous performance in the fourth quarter indicates the number of chemical hazard events will exceed 400 events and thus,

exceed the 5-year DOE average of 381 events. The predicted value is shown in light green. One chemical hazard event, a CO_2 fire suppression system accidental discharge, was responsible for the sole DOE fatality in 1998.



The remaining performance indicators did not show any significant improvement or adverse trends.

Survey

Attached in Appendix D is a survey asking for your feedback on this report. We need your input to determine if we are serving your needs. Please take a moment to fill it out and return it to us.

On the Web

This report and additional analytical tools, techniques, and data can be found at our Internet Web site. Please visit us at http://tis.eh.doe.gov/oeaf.

Tom Rollow, PE
Director
Office of Operating Experience Analysis

Contact for Additional Information

For further information, contact:

Office of Operating Experience Analysis
EH-33/270CC/GTN
U.S. Department of Energy
Washington, DC 20585

Phone: 301-903-5749
e-mail: samuel.rosenbloom@eh.doe.gov

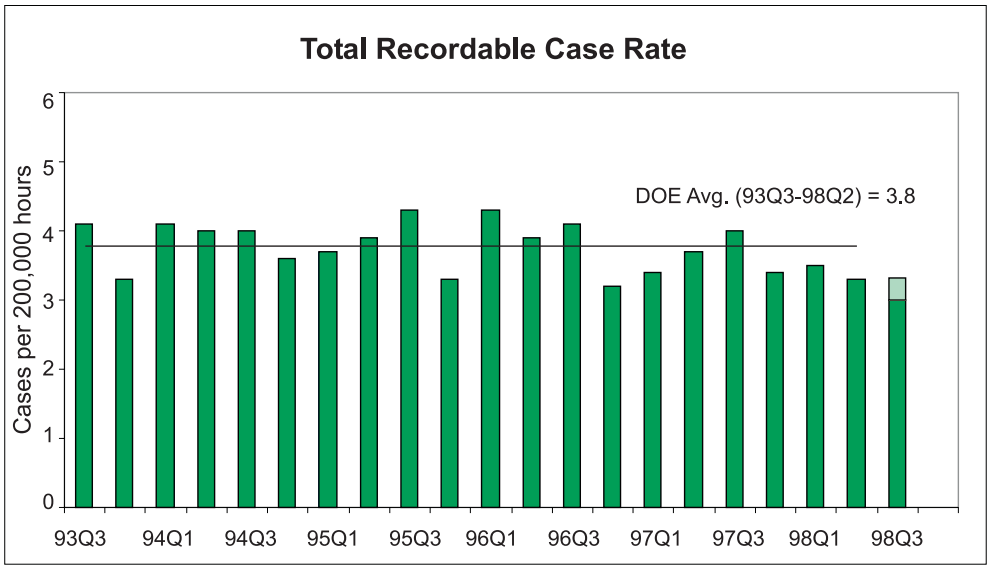
This page intentionally left blank.

Indicator

1. Total Recordable Case Rate

Definition

Work-related death, injury or illness, which resulted in loss of consciousness, restriction of work or motion, transfer to another job, or required medical treatment beyond first aid.

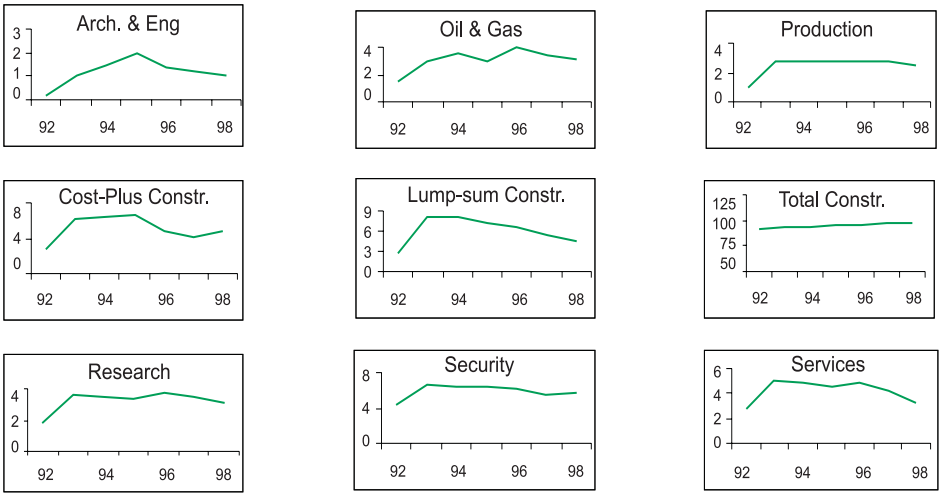


Source: DOE Data–Computerized Accident/Incident Reporting System.
Note: Extended portion at the top of 98Q3 depicts the estimated increase due to late reporting.

Key Observations

- The 98Q3 TRC rate (cases per 200,000 hours worked) is expected to equal the rate for 98Q2. This would establish the lowest average attained over the first three quarters of any year.
- In 98Q3, the estimated 1016 total reportable cases will represent a 20% decrease in the number of cases reported when compared to the third quarter of 1997. For the same period of time, there was a 3% decrease in the number of work hours.
- About 44% of the total recordable cases were lost workday cases, which represents a 4% decrease from the same quarter in 1997. The 98Q3 lost workday case rate is expected to equal the same rate as the two previous quarters (1.5), which will represent a 21% decrease over the same quarter in 1997.

Distribution by Operation Type (Annual Trends)



- TRC rates for 98Q3 ranged from 5.2 for employees performing work activities in security organizations, to 0.0 for employees working in architectural and engineering operations.
- With the exception of Cost-Plus Construction and Oil & Gas operations, all other operations categories experienced a decrease in TRC Rate over the same quarter in 1997.

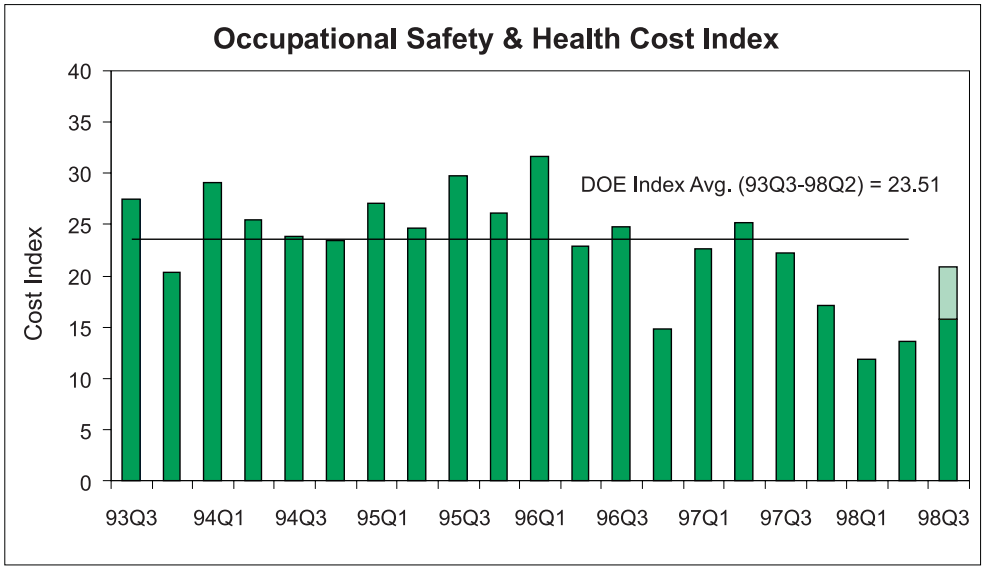
Additional Analysis

Indicator

2. Occupational Safety and Health Cost Index

Definition

Represents the approximate amount of dollars lost (indirect and direct) per 100 hours worked for all injuries/illnesses using the formula specified in Appendix C, Glossary. The coefficients used in the Cost Index formula are weighing factors derived from a study of the direct and indirect dollar costs of injuries. The index is not commonly used in private industry. DOE sites use this index to measure their progress in improving worker safety and health.

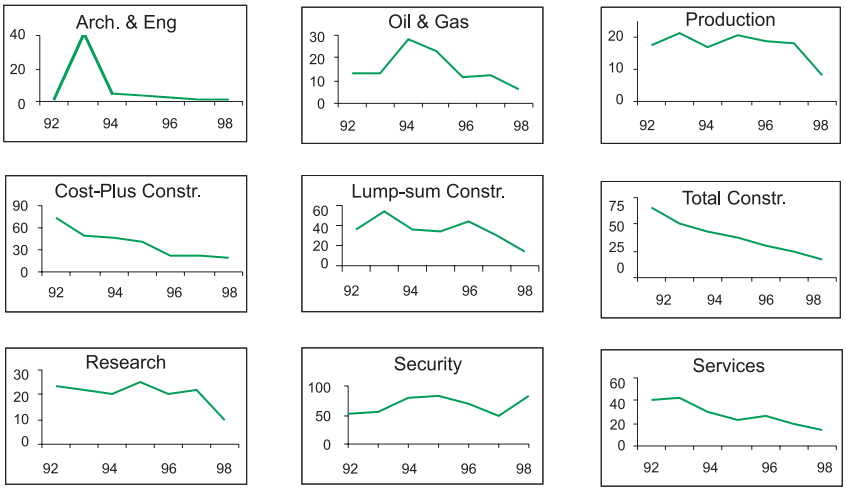


Source: Computerized Accident/Incident Reporting System.
Note: Extended portion at the top of 98Q3 depicts the estimated increase due to revisions in lost worktime and late reporting.

Key Observations

- One fatality occurred in 98Q3 (July 28) at the Idaho National Engineering and Environmental Laboratory (INEEL) when a worker was exposed to a lethal atmosphere created by the inadvertent discharge of a CO_2 fire suppression system.
- The estimated 98Q3 Cost Index for DOE contractors is 20.86. When compared to the actual 97Q3 Cost Index, the estimated 98Q3 index represents a decrease of 6%.
- Even with the increase in the Cost Index expected to occur for 98Q3, this quarter is the lowest Cost Index value for the same quarter over the past five years.
- Revisions in lost worktime and late reporting will typically increase the value of the Cost Index 30-60% of the most recent quarters.

Cost Index Distribution by Operation Type (Annual Trends)



- Security operations experienced a Cost Index of 154.37 this quarter, due primarily to eight transfers and/or terminations. The fatality was experienced in the Service operations.
- Architectural and Engineering did not experience any recordable injuries/illnesses this quarter; therefore, their Cost Index was zero.

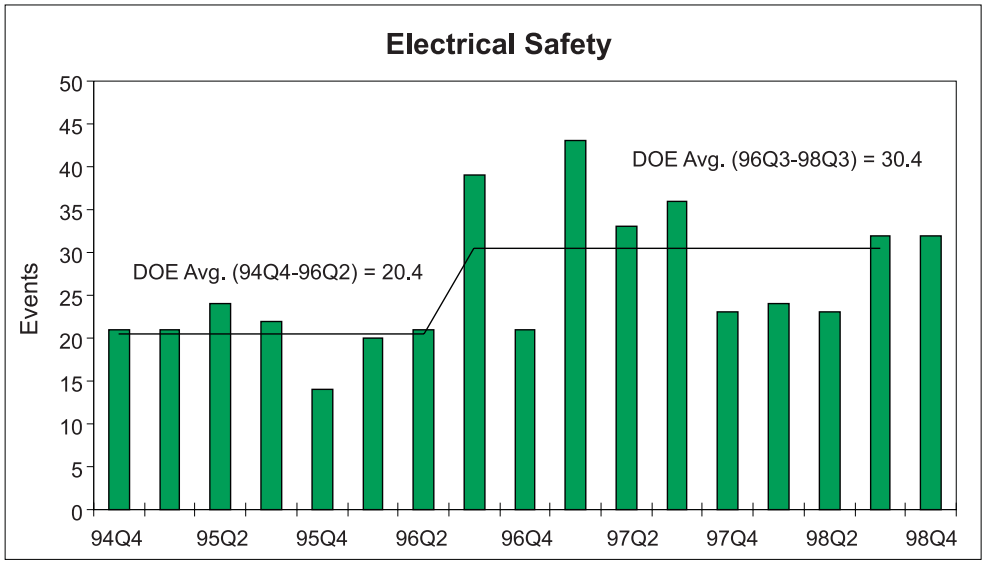
Additional Analysis

Indicator

3. Electrical Safety

Definition

The number of events involving worker contact or the potential for contact with electrically energized equipment. These events are reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.



Source: Review of Occurrence Reports by Department Analysts.

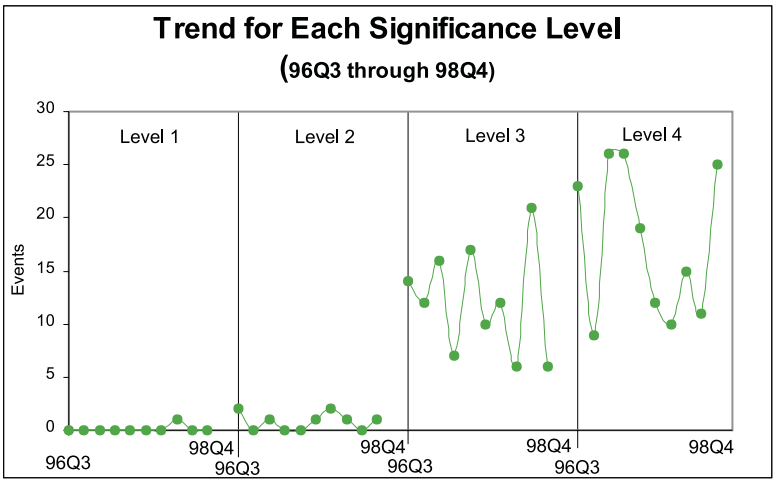
Key Observations

- The relative significance of electrical safety events has increased slightly from 1997 to 1998.
- The number of electrical safety events in 98Q4 remained at 32, the same number as in 98Q3. The data continues to indicate that the baseline for electrical safety events statistically shifted in 96Q3.
- With the exception of one Significance Level 2[1] event (an event resulting in injuries that require hospitalization), the relative significance of the electrical safety events decreased notably from last quarter.
- Nine of the 32 events this quarter involved lockout/tagout problems. These problems included lack of or inadequate lockout/tagouts and failure to use lockout/tagouts. One of the events involving lockout/tagout problems was a Significance Level 2 event that resulted in second and third degree burns to a subcontractor crane technician's right hand.

[1]Level 1 Significance (Electrical safety) – fatality or permanent disability
Level 2 Significance (Electrical safety) – injury requiring off-site hospitalization
Level 3 Significance (Electrical safety) – onsite medical aid, possible minor injuries
Level 4 Significance (Electrical safety) – no medical aid required, no injuries

Significance of Events

- Significance of electrical safety events is ranked in accordance with Table 1, *EH-33 Performance Indicator Significance Criteria*, which is included in Appendix B-3 of this report. Significance ranking of electrical safety events started in 98Q1. The following graph illustrates the number of events for each significance level for the past four quarters, and the trend for each significance level.



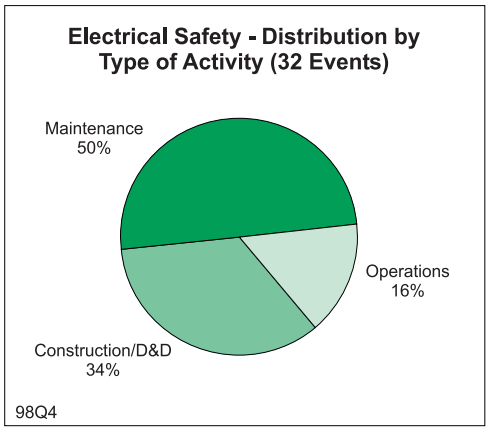
- With the exception of one Significance Level 2 event, the relative significance of the electrical safety events decreased notably from last quarter. In 98Q4, 78% of the events were Significance Level 4, its lowest level, and 20% were Level 3. In 98Q3, only 34% were Level 4, and 66% were Level 3.
- The relative significance of electrical safety events have increased from 1997 to 1998. Although there were 24 fewer events in 1998, there were more than twice as many Level 1 and Level 2 events (combined) in 1998 than in 1997 (five in 1998; two in 1997).

Significance Level	1997	1998
Level 1	0	1
Level 2	2	4
Level 3	50	45
Level 4	83	61
Total number of events	135	111

Additional Analysis

Distribution by Activity

- The number of events during maintenance activities increased significantly from 6 events (18%) in 98Q3 to 16 events (50%) in 98Q4. This represents the highest contribution from maintenance activities over the two years that this activity data has been tracked.

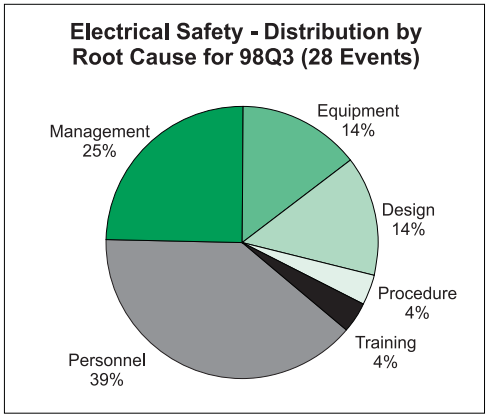


Distribution by Location

- Except for Savannah River, which reported nine events, electrical safety events were spread evenly across sites, with no other site reporting more than four events. Ten of the 14 sites reporting events reported only one or two events. The nine events reported at Savannah River were the most for one quarter by any site over the four years that location data has been tracked.

Distribution by Root Cause*

- The distribution of 98Q3 electrical safety events by root cause is similar to the previous four quarters, with about 64% of events caused by either management problems or personnel error.



*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

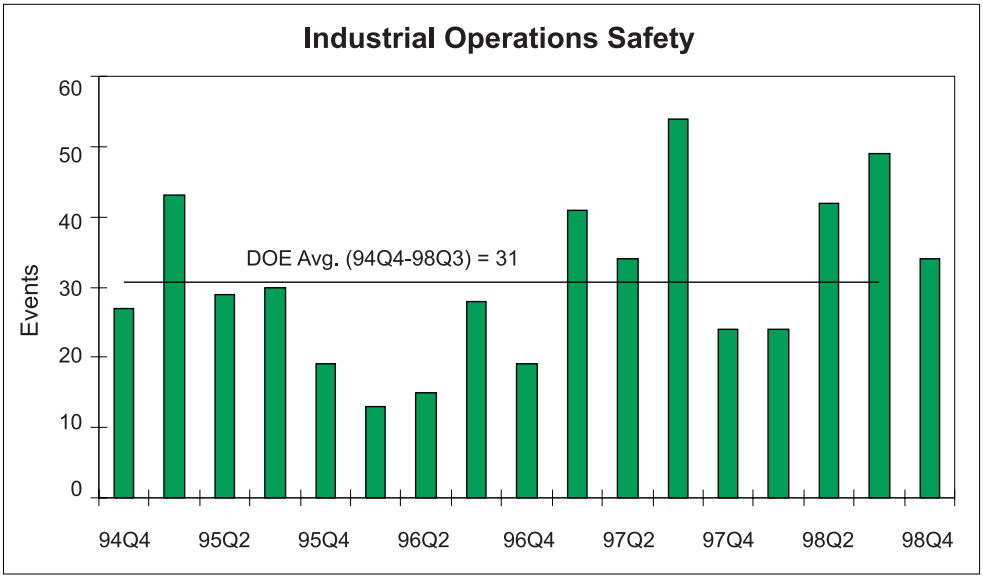
This page intentionally left blank.

Indicator

4. Industrial Operations Safety

Definition

Number of operations-related events involving construction equipment, forklift operations, machining operations, hoisting, rigging, or excavation reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.



Source: Review of Occurrence Reports by Department Analysts.

Key Observations

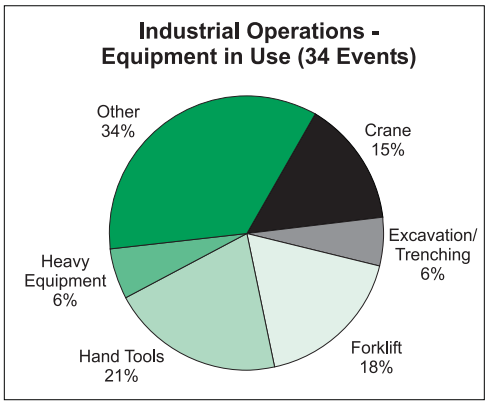
- There was a 33% reduction in the total number of industrial operations safety events (34) this quarter (98Q4) compared to 98Q3.
- 98Q4 experienced the highest fourth quarter total for the past 5 years. This is the first fourth quarter in that period of time to have exceeded the DOE average.
- Two (6%) of the 34 events resulted in injury, the same percentage as last quarter.
- This quarter, 5 of the 34 industrial operations safety events involved utility incursions (underground, structural penetration, or overhead); this represents a 32% reduction over 98Q3.

Additional Analysis

- A slightly lower total number of industrial operations safety events occurred in 1998 (148) compared to 1997(153).
- The 98Q4 total for industrial operations safety events was expected to be lower than 98Q3 since winter conditions experienced at many sites curtail much of the outside work, particularly excavation/trenching activities. These activities dropped from 16% of the total industrial operations safety events in 98Q3 to 3% this quarter.

Equipment In Use

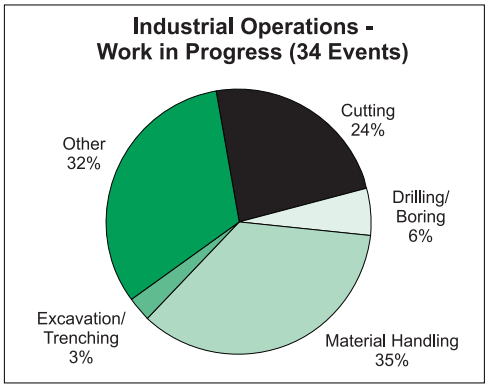
This analysis only addresses equipment (forklifts, backhoes, cranes, hand tools, etc.) that were reported as being in use at the time an event occurred.



- Categories identified on the chart remained relatively constant throughout the year. However, during the last 2 quarters of 1998, enough events were occurring with the use of hand tools that a separate breakout was warranted.
- For 98Q3 and 98Q4, the use of hand tools accounted for 24% and 18% of the events respectively.

Work In Progress

This analysis addresses the type of work activity being performed at the time an event occurred.



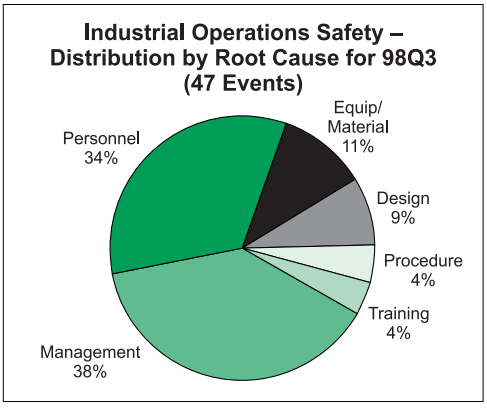
Utility Incursion Data

- Last quarter (98Q3) was the first time utility incursions were discussed in a separate section of the industrial operations safety events analysis. In that initial analysis, reference was made to a DOE Safety Notice (96-06) that addressed the danger of unexpected discovery of underground utilities during excavation or trenching operations. This quarter, a DOE Lessons Learned Report was issued (98-02) that addressed the danger of unexpected penetration of concealed utilities during such activities as drilling and cutting through walls, floors, and ceilings. The following analysis is focused on utility incursion events that occur underground, overhead, or during structural penetration (walls, floors, ceilings).
- In 1998, utility incursions accounted for 32% of industrial operations safety events.
  - The percentages of "underground" and "structural penetration" utility incursions were nearly equal (43% and 36% respectively) with "overhead" utility incursions at 21%.
  - 66% (31) of the events involved electrical incursions, 24 (77%) of which involved actual contact with, or the severing of energized electrical conductors. Incursions involving water lines comprised 15% of the events.

  - In 11% of the incursions, safety status was degraded as a secondary effect due to the impact on an emergency siren, fire sprinkler systems, and emergency notification speakers.
  - In 51% of the incursion events, excavation/trenching equipment were involved; however, hand held tools were involved in 36% of the incursions. This should be of even greater concern due to the closer proximity of the worker to the respective hazard.
  - For DOE Operations Offices, Albuquerque (ALO) had the highest percentage of utility incursions at 32% with Savannah River at 15%. Idaho and Ohio each had 11%, while Oak Ridge and Rocky Flats accounted for 9% each.
- In 98Q4, there were five utility incursions: 1 underground, 1 structural penetration (drilling a hole into a concrete ceiling), and 3 overhead incursions. This represents a 77% reduction in utility incursions over the previous quarter, as well as the lowest percentage of incursions in 1998.
- In 98Q4, four of the five utility incursions involved electrical utilities, 1 of which involved contact with an energized line while using a hand held drill. The remaining 3 electrical incursions involved the operation of a fork truck and excavation equipment.
- In two of the utility incursion events, poor communication between the prime contractor and subcontractors played a significant role.

Distribution by Root Cause*

- Of the 49 industrial operations safety events recorded for 98Q3, 47 had root causes established.
  - Work Organization/Planning Deficiency was the most often cited for Management Problems, while Procedure Not Used/Used Incorrectly was the most often cited cause for the Personnel Error category. For the category Equipment/Material Problem, Defective or Failed Part was the most often cause cited.



* Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

This page intentionally left blank.

Indicator

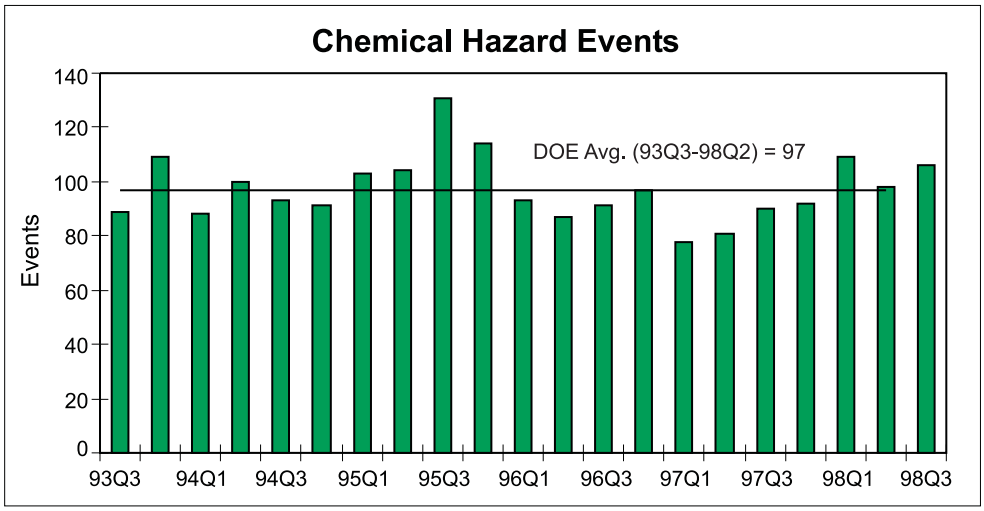
5. Chemical Hazard Events

Definition

Number of events reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*, that are gathered by a word search for specific chemical names. The selected events are reviewed and screened for conditions meeting one of the following categories:

No change to this section since last report.

- Class 1 - An injury or exposure requiring hospital treatment or confirmed, severe environmental effect.
- Class 2 - Minor injury (first aid) or exposure, or minor environmental damage.
- Class 3 - Potential precursors to the occurrences in Class 1 or 2.
- Class 4 - Minor occurrences such as leaks, spills, or releases that are significant by the frequency, but not by the consequences.



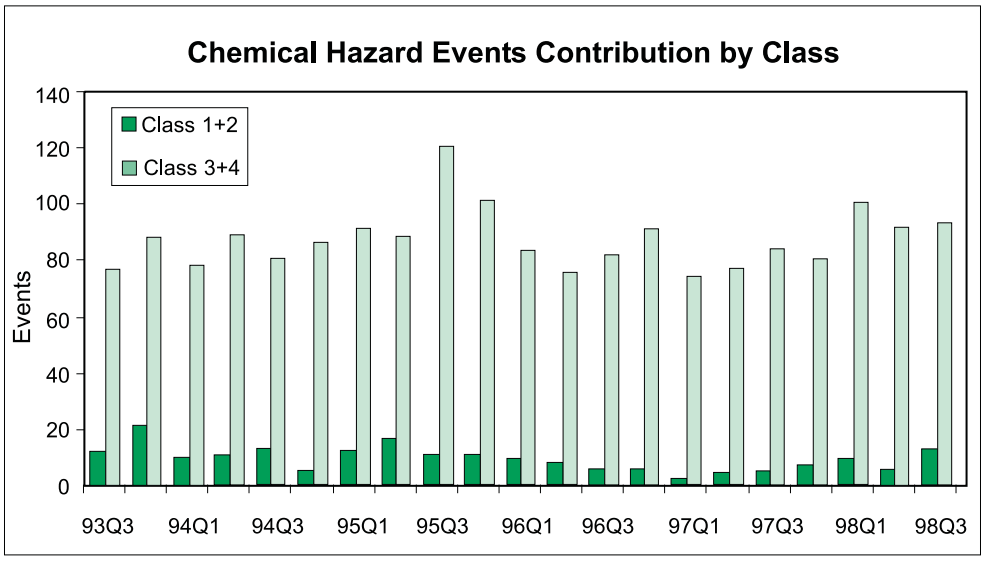
Source: Office of Field Support, EH-53, Chemical Safety Concerns: A Quarterly Review of ORPS (draft, posted on the Web at http://www.dne.bnl.gov/etd/csc/)

Key Observations

- In 98Q3 there was an 8% increase in the number of chemical hazard events (106) over 98Q2. This is the third consecutive quarter in which the number of events have exceeded the five year average of 97. Since 97Q1, there has been an overall increasing trend in the number of chemical hazard events.
- Class 1 and 2 events show an increasing trend over the last six quarters. There were 13 Class 1 and 2 events for 98Q3, the third highest total since 93Q4; 12 of the 13 events were Class 2.
- In 98Q3, one Class 1 event involved a fatality and three serious injuries. This accident occurred at the Idaho National Engineering and Environmental Laboratory when fire retardant carbon dioxide (CO_2) was accidentally released during routine maintenance operations.

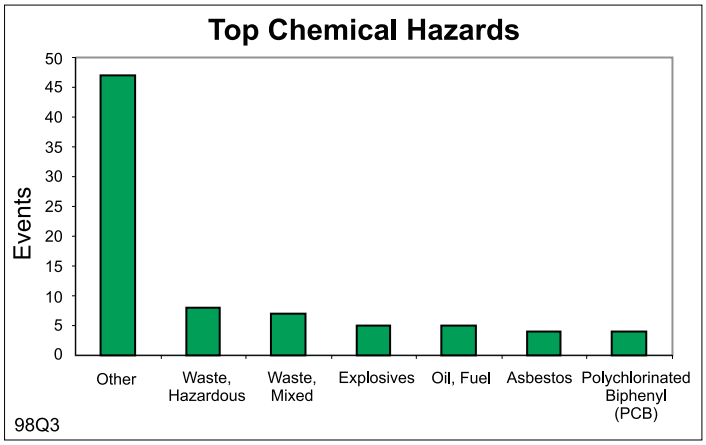
Characterization of Chemical Hazard Events

- There were 12 Class 2 events this quarter, up from 6 in 98Q2. Some of the more noteworthy events are:
  - Three Class 2 events involved overpressurized storage containers. In two cases, lids blew off of the containers as they were being opened to perform sampling for waste characterization.
  - One Class 2 event resulted in three workers suffering varying degrees of burn when acetone vapor ignited during a cleaning operation.
  - At Hanford, a Class 2 event involved the inadvertent discharge of a Halon system during maintenance functional test activities. While the event was similar to the one at INEEL that resulted in one fatality and several injuries, this event resulted in five personnel being successfully evacuated.



Distribution by Chemicals Involved

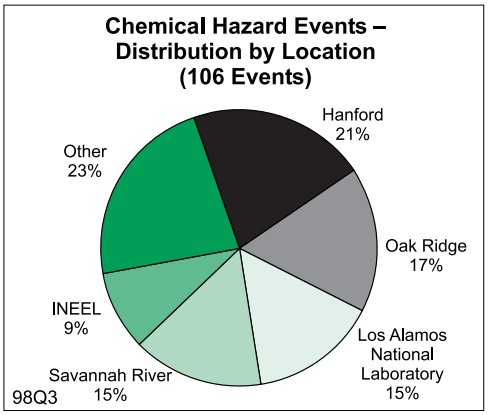
- In 98Q3, there was not one category of chemical events or individual chemicals that dominated the distribution.



Additional Analysis

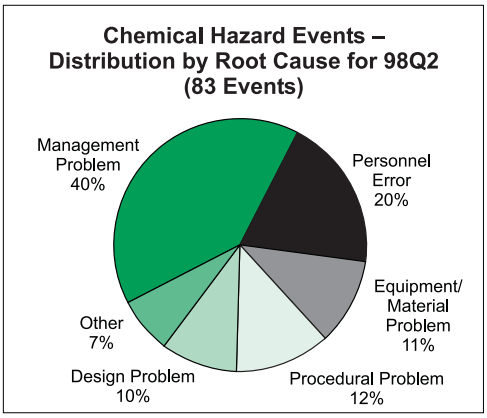
Distribution by Location

- Of the 22 events reported at Richland, one was a class 2 event with the rest class 3 events. The class 2 event involved an inadvertent discharge of a Halon system during a maintenance functional test.
- The 18 events at Oak Ridge involved a variety of hazards including, uranium, hydrogen fluoride, Halon, and PCBs among others.



Distribution by Root Cause*

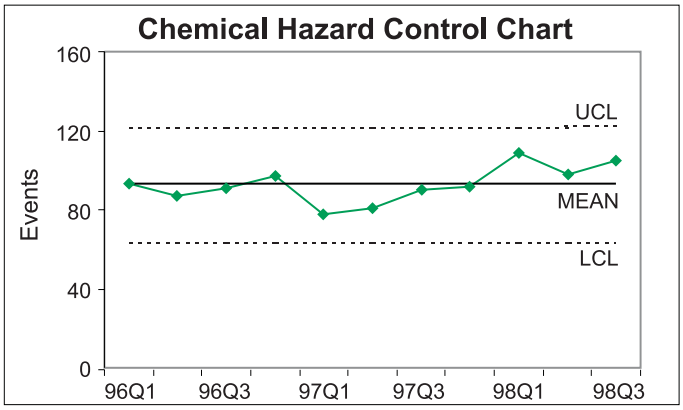
- Of the 98 chemical hazard related events reported in 98Q2, 83 had root causes assigned. Of these, the top 2 categories were Management Problems (33 events) and Personnel Error (16 events). Procedure and Material/Equipment problems accounted for 10 and 9 events respectively.
  - Of the management problems cited, Inadequate Administrative Control was cited the most (13), with Work Organization/Planning Deficiency, and Policy Not Adequately Defined, Disseminated, or Enforced with 6 each.
  - In the Personnel Error category, the most frequently cited was Procedure Not Used or Used Incorrectly; Inattention to Detail was second.
  - Of the Equipment/Material Problems cited, Defective or Failed Part was the most often cited.



*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

Statistical Process Control (SPC) Analysis

- The processes in place to prevent chemical hazard events remains within statistical process control.

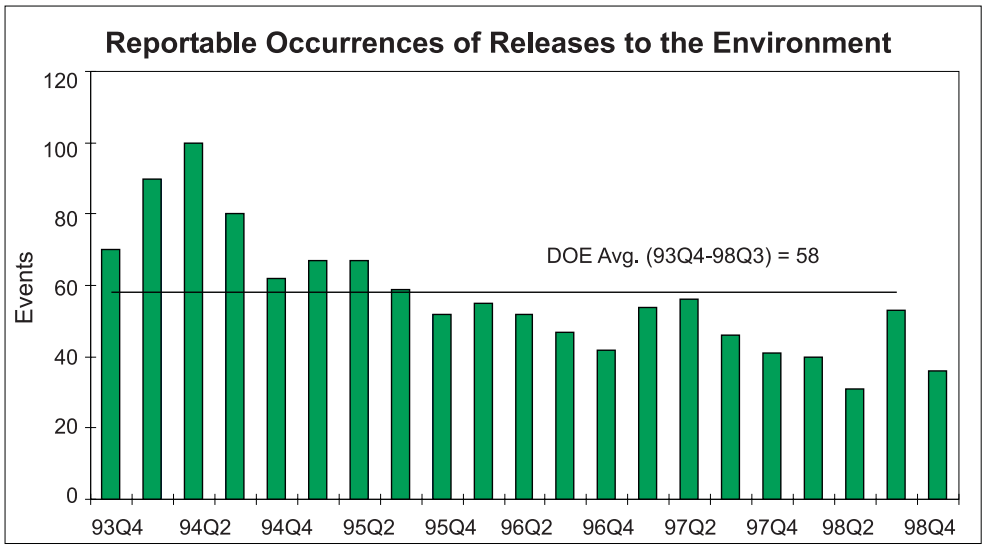


Indicator

6. Reportable Occurrences of Releases to the Environment

Definition

Releases of radionuclides, hazardous substances, or regulated pollutants that are reportable to federal, state, or local agencies.



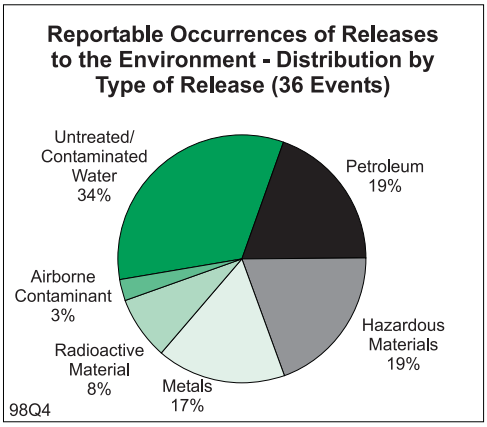
Source: Review of Occurrence Reports by Department Analysts.

Key Observations

- 1998 had the fewest number of reported release events for any year. The average number of events per quarter was 40 in 1998 compared to 49 in 1997 and 1996.
- In 98Q4, the Department experienced a decrease in the number of reported release events when compared to the previous quarter (over 30%). The single largest contributor to these reportable occurrences is untreated or contaminated water releases.
- The decrease in 98Q4 further demonstrates a downward shift in the number of events over the past 3 years. This downward shift is substantiated by the 13 consecutive quarters from 95Q4 to 98Q4 that have all been below the DOE average.

Additional Analysis

Distribution by Type of Release

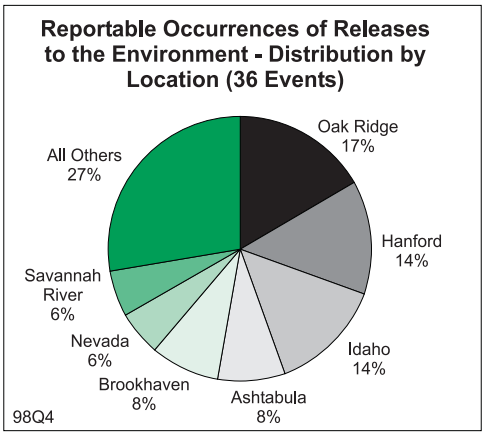


- Untreated/contaminated water and petroleum releases were the largest contributors in 1998 to release events (37% and 23%, respectively). Most of the water related events were caused by NPDES permit exceedances. Petroleum related events were primarily caused by oil/diesel spills.
- For the second consecutive quarter, untreated/contaminated water releases represented the single largest type of release. Of these 12 events, over half (7 events) involved NPDES permit exceedances for a variety of parameters including fecal coliform, total dissolved solids, acute toxicity and dissolved chlorine and nitrogen.

- Petroleum products, generally the largest contributor to the reportable occurrences, was also a major contributor in 98Q4 (7 events). These events involved oil spills, a leak from a damaged fuel line, improper disposal of oil, and, in three cases, oil sheens seen on ponds and outfalls.
- Other reported releases of significance included seven releases of reportable quantities of hazardous materials. Three of these releases occurred at Richland's Hanford Site involving sodium hydroxide, methylenechloride, and an isocynate mixture.

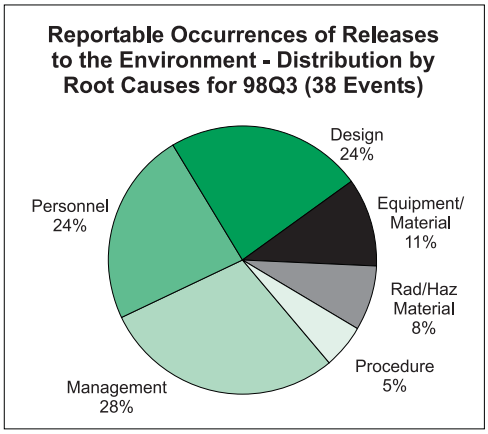
Distribution by Location

- The top contributors of release events during 1998 were Hanford, Savannah River, and Idaho. These three sites accounted for 52 of the 159 events (33%).
- This quarter's primary locations of releases, Oak Ridge (6 events) and Hanford (5 events), have consistently been the top locations for the past 20 quarters. Idaho was also a significant location this quarter with five events.
- Although Hanford was a primary location of releases, the number of events from 98Q3 to 98Q4 decreased from 12 to 5. Similar decreases this quarter were also noted at Savannah River (from 7 to 2) and Kansas City (from 5 to 0).



Distribution by Root Cause*

- Of the 53 events reported in 98Q3, 38 had root causes established. Consistent with the previous quarters in 1998, the three most common root cause categories were management, personnel and design. The majority of management related events were attributed to policy not adequately defined, disseminated, or enforced. Personnel related events were primarily caused by inattention to detail, whereas the design category's largest cause was inadequate or defective design.
- Management caused events continued to be the primary cause for release events in 1998. Approximately one-third (33%) of the events were assigned a root cause of management. This annual percentage has remained fairly constant since 1993.
- In 1998, a reduction was seen in the number of release events caused by equipment/material failures. Since 1993, equipment/material failures have been the second leading cause of release events (25%). In 1998, only 11% of the events were caused by equipment/material failures dropping to fourth behind design (22%) and personnel (18%).



*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

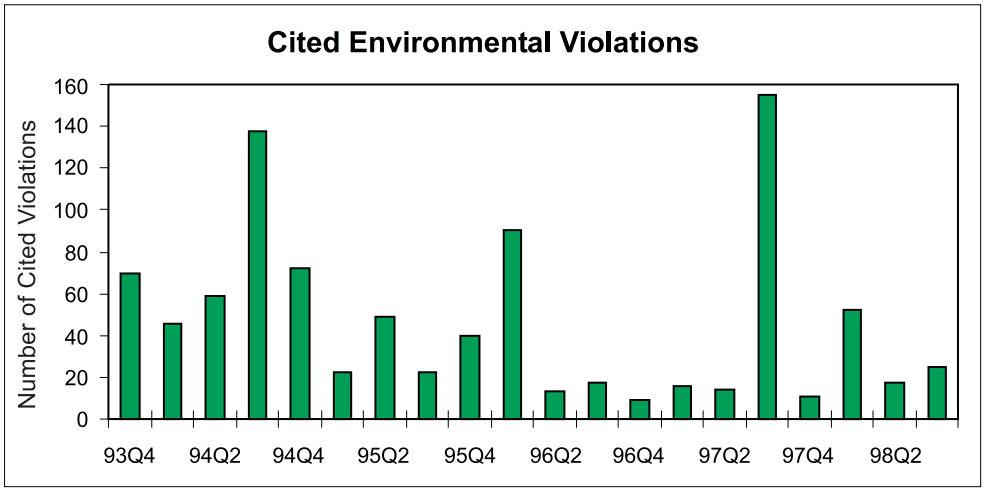
Indicator

7. Cited Environmental Violations

Definition

Number of environmental violations cited in enforcement actions, e.g., Notices of Violations (NOVs), by regulators at DOE facilities. (An NOV may cite one or multiple violations).

No change to this section since last report.



Source: EH-41 Compliance Database.

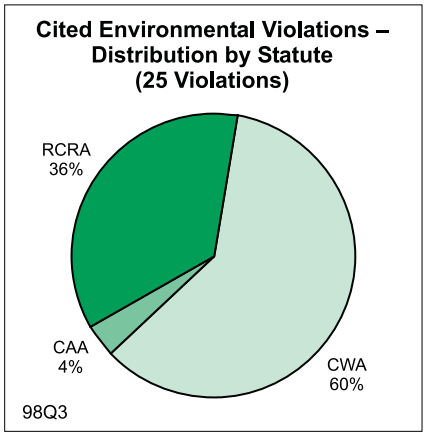
Key Observations

- Twenty-five violations, in seven Notices of Violation, were cited in 98Q3.
- Thirteen water discharge permit exceedances at Savannah River, cited in a single NOV, account for more than half of the cited violations.
- **A single large penalty was assessed in the third quarter, in connection with missed milestones in the Rocky Flats cleanup effort.**

Additional Analysis

Violations by Statute

- Clean Water Act violations predominate, with RCRA accounting for nearly all the rest. Three Notices of Violation were issued under the Clean Water Act and three under RCRA.
- A single Notice of Violation at the Savannah River Site cited thirteen separate violations of water quality discharge permit standards.

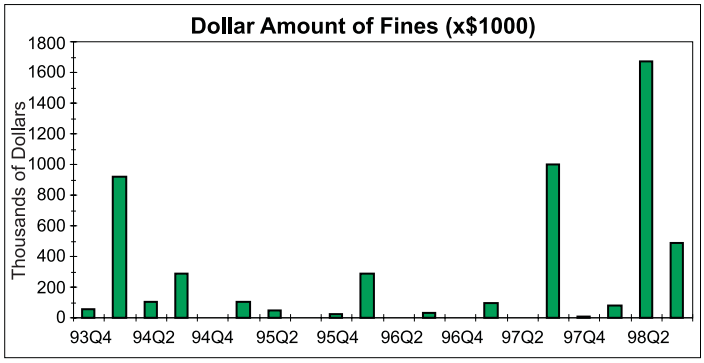


RCRA = Resource Conservation & Recovery Act (and related state laws)

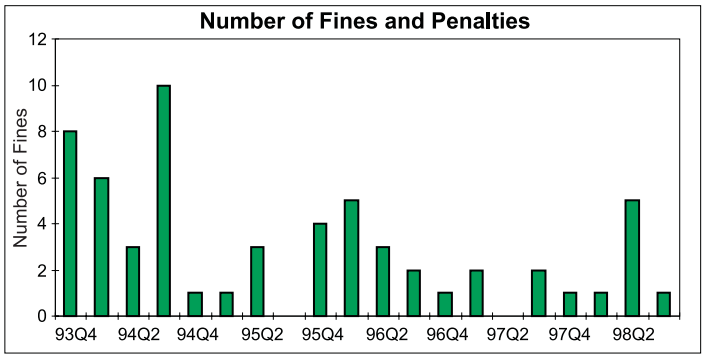
CAA = Clean Air Act (and related state laws)

CWA = Clean Water Act (and related state laws)

Fines



- A penalty of $490,000 was assessed at Rocky Flats in a Compliance Order related to delays in draining plutonium and nitric acid tanks. $100,000 will be paid to the State of Colorado; the remaining $390,000 will be applied to Rocky Flats programs involving accelerated repackaging and off-site shipment of waste materials.

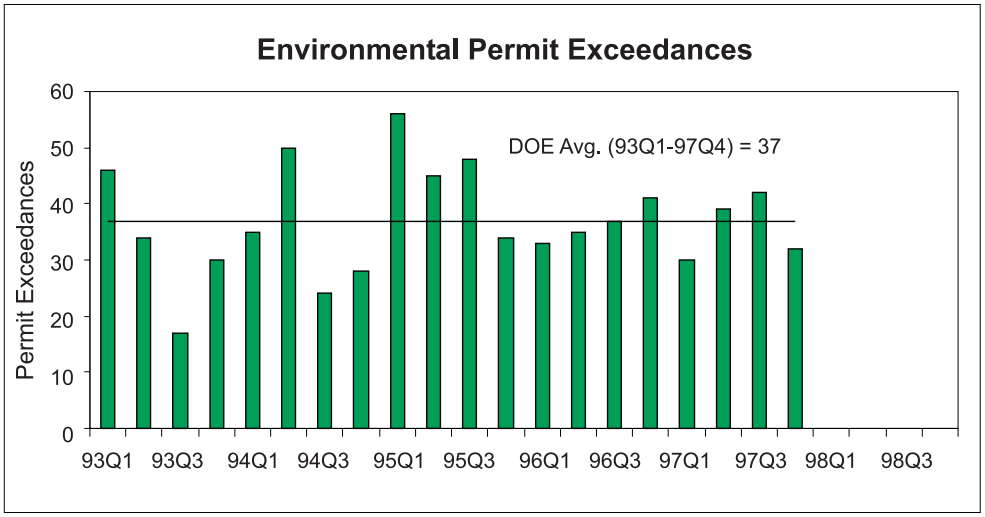


Indicator

8. Environmental Permit Exceedances

Definition

Exceedance of release levels specified in air and water permits during the quarter.



Source: Annual Site Environmental Reports, additional site data.

Key Observations

- The number of DOE permit exceedances continues essentially unchanged in 1997.
- The overall numbers mask some large increases and decreases at individual sites.

Additional Analysis

- Nearly all exceedances continue to occur under National and State (water) Pollution Discharge Elimination System Permits.
- The following table depicts some of the more noteworthy changes in the number of permit exceedances between 1996 & 1997.

Locations of Major Changes in Permit Exceedances		
	1996	**1997**
Increases		
Pantex	17	34
Lawrence Livermore Nat'l. Laborat.	0	8
Decreases		
Los Alamos	13	6
Princeton Plasma-Physics Laborat.	5	0
Strategic Petroleum Reserve	9	4
Savannah River	12	6

This page intentionally left blank.

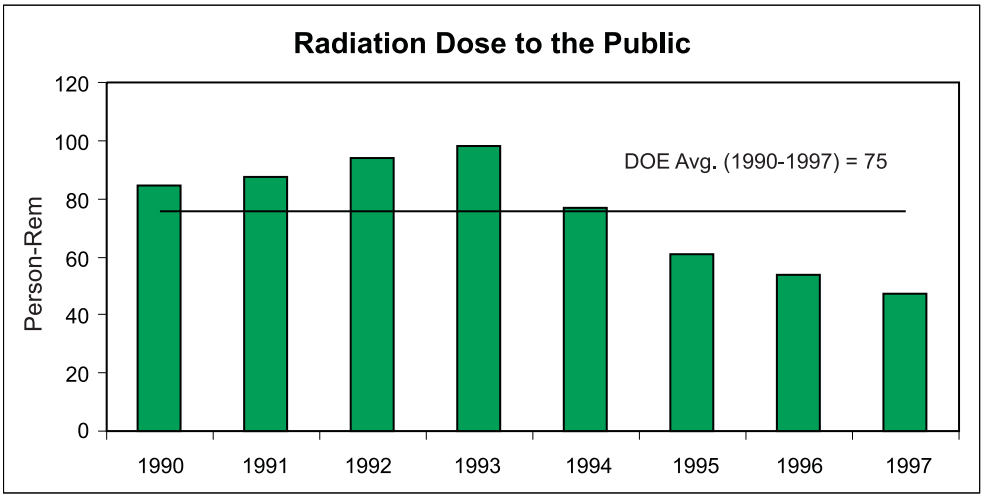
Indicator

9. Radiation Dose to the Public

Definition

Total collective radiation dose (person-rem) to the public within 50 miles of DOE facilities due to radionuclide airborne releases. ("Collective radiation dose" is the sum of the effective dose equivalent to all off-site people within a 50-mile radius of a DOE facility over a calendar year.)

No change to this section since last report.



Source: Annual reports to EPA; EH-41 data tabulation.

Key Observations

- Total collective radiation dose to the public from DOE sources was very low compared to the public dose from natural background radiation. The total collective radiation dose to the public around DOE sites from air releases was one ten-thousandth of the dose received by the same population from natural background radiation.
- Total collective radiation dose to the public in 1997 decreased 12 percent (6.4 person-rem) from the previous year. The decrease was primarily associated with a decrease at Rocky Flats (10 person-rem.) This was partially offset by an increase at Fernald Environmental Management Project (4 person-rem).
- Estimated collective dose has steadily decreased over the last five years. Estimated collective dose for 1997 is about one-half of the value from five years ago.

Additional Analysis

- About 70% of the estimated collective dose for 1997 occurred at four sites: Oak Ridge, Fernald, Princeton Plasma Physics Laboratory, and Savannah River Site. This is consistent with 1996.
- A 10 person-rem decrease was reported at Rocky Flats; from 1996 to 1997; a return to previously low values. High values were reported in 1996 due to decontamination and decommissioning work, particularly excavations at the T-3 and T-4 trenches.
- A 4 person-rem increase was reported at Fernald; this represents a 70% increase over 1996. The increase at Fernald is due to the start of active remediation, particularly soil excavation; these activities are expected to continue for the next few years.

This page intentionally left blank.

Indicator

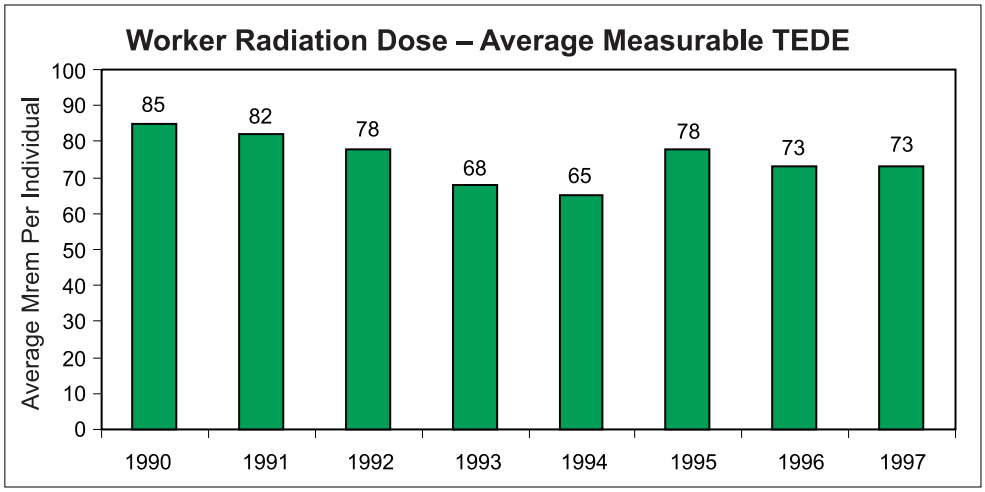
10. Worker Radiation Dose

Definition

Average measurable dose to DOE workers, calculated by dividing the collective total effective dose equivalent (TEDE) by the number of individuals with measurable dose.

TEDE is determined by combining both internal and external contributions to an individual's occupational exposure. The number of individuals receiving measurable dose is used as an indicator of the exposed work force size.

No change to this section since last report.

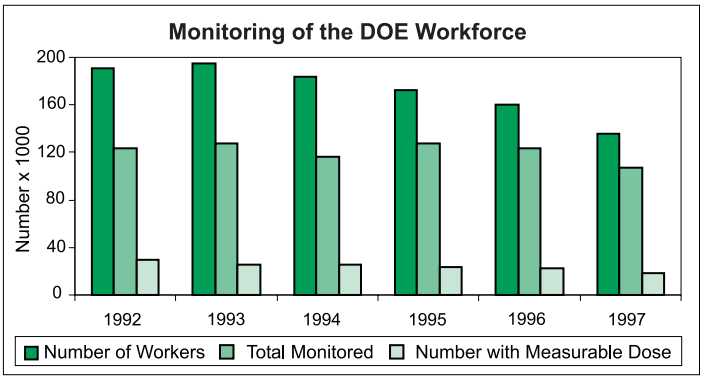


Source: U.S. Department of Energy, DOE/EH-52 and DOE Occupational Radiation Exposure Report.

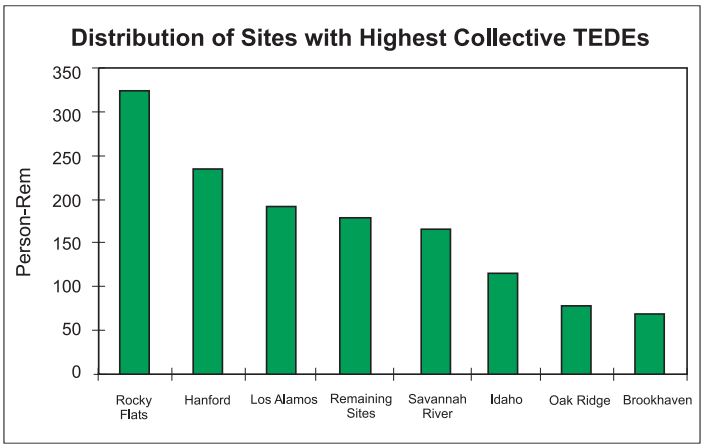
Key Observations

- Between 1996 and 1997, the DOE collective total effective dose equivalent decreased by 18 percent due to decreased doses at 5 of the 7 dose sites with the highest radiation dose. Further, transfer of regulatory authority of the Paducah and Portsmouth Gaseous Diffusion Plants to the Nuclear Regulatory Commission account for 1.8 of those percentage points, as that dose is no longer reported to the DOE.
- There was one exposure (estimated at 15-30 rem; estimated doses are not included in the 1997 collective TEDE) over the DOE five-rem TEDE limit associated with an intake of Curium-244 at Lawrence Livermore National Laboratory. The identified root causes were management's failure to adequately analyze, control, and manage a hazardous waste treatment operation (HEPA filter shredding). There were three additional exposures that exceeded the DOE Administrative Control Limit of two rem but did not exceed the five-rem limit.
- There is a statistically significant increase in the mean of extremity doses each year since 1994 (60%).
- The dose associated with neutron exposure continues to decrease primarily due to reduction in plutonium handling activities at Los Alamos National Laboratory (41% of the neutron dose over the past 3 years).

- Additional information concerning exposure received by individuals associated with DOE activities is included in the DOE/EH-0564, *Occupational Radiation Exposure Report 1997* (on line at http://rems.eh.doe.gov/annual.htm).



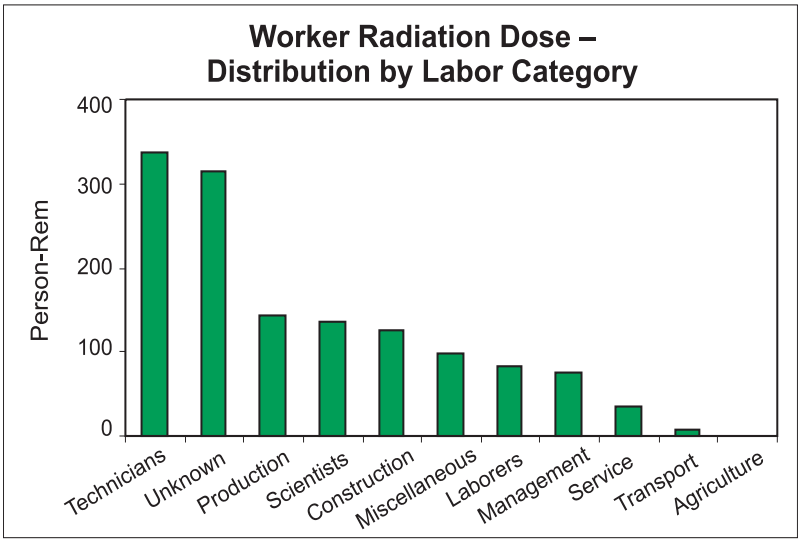
- The percentage of the DOE workforce monitored for radiation exposure has decreased by 12 percent from 1992 to 1997. However, most of the monitored individuals do not receive any measurable radiation dose. Only 19 percent of monitored individuals (14 percent of the DOE workforce) have received a measurable dose during the past 5 years.



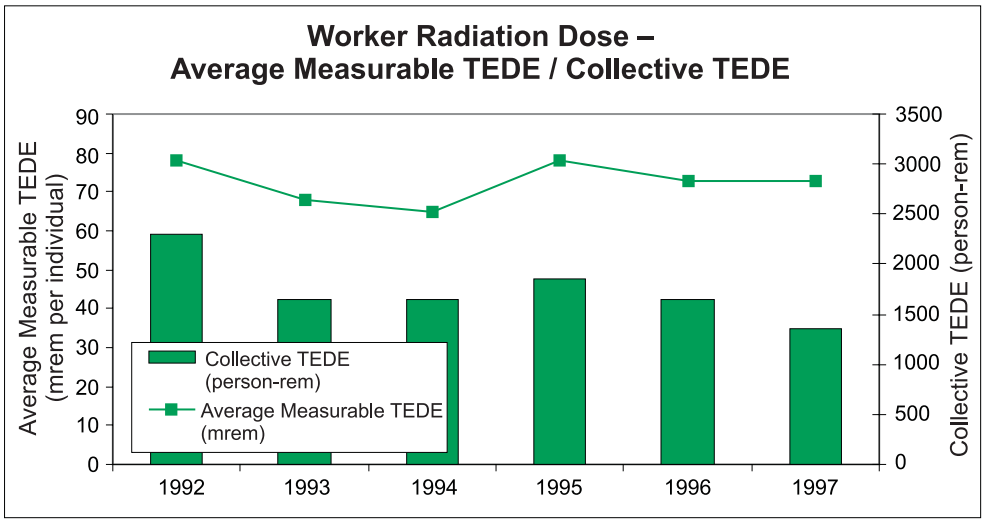
- 87 percent of the collective TEDE for the DOE Complex was accrued at 7 DOE sites in 1997. These 7 sites were (in descending order of collective dose) Rocky Flats, Hanford, Los Alamos, Savannah River, Idaho, Oak Ridge, and Brookhaven. It should be noted that Rocky Flats and Hanford accounted for 41 percent of this dose and are the two largest contributors to the collective TEDE. These sites were primarily involved in nuclear materials stabilization and waste management.

Additional Analysis

Savannah River and Brookhaven experienced the largest percentage decreases (34 and 41 percent) in collective TEDE of the 7 sites.



- Technicians continue to receive the highest collective dose of any specified labor category.



- Of the technicians, forty-two percent of the dose is attributed to radiation protection technicians.
- The number of workers with measurable internal dose increased by 19% from 1996 to 1997, and the collective TEDE increased 15% primarily due to reporting of radon doses by the Grand Junction Office for the first time in 1997. The radon doses are the result of environmental remediation activities of uranium tailings at the former Monticello uranium mill site. 1997 is the first year radon was tracked as a source of occupational exposure for DOE.
- At Rocky Flats, the collective neutron dose increased 120 percent in 1997 because of activities related to product stabilization and decommissioning and decontamination activities.

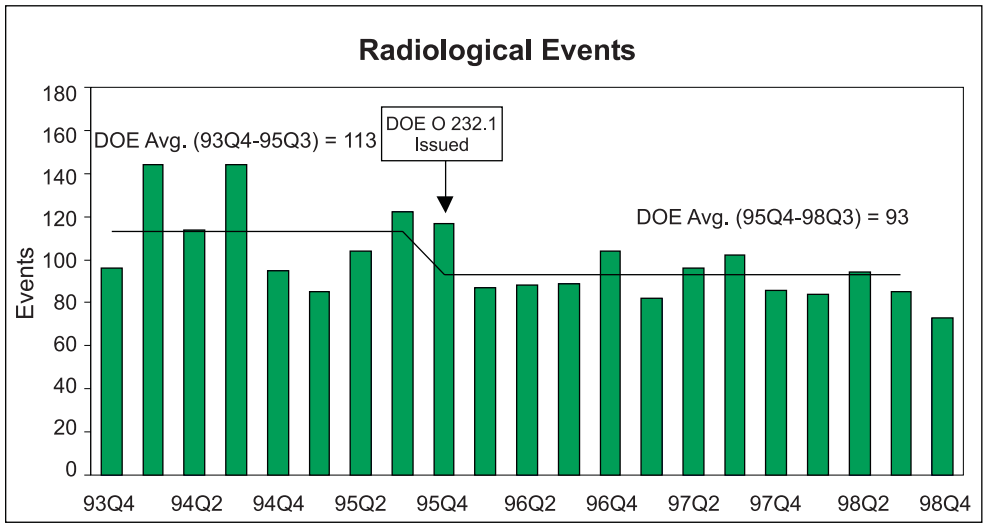
This page intentionally left blank.

Indicator

11. Radiological Events

Definition

Number of reportable radiological events as defined in DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*. These events are made up of both personnel contaminations and radiation exposures that are reported as personnel radiation protection events.



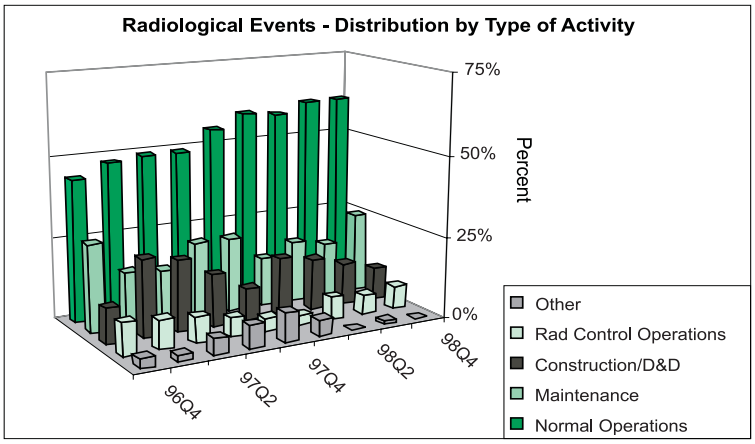
Source: Review of Occurrence Reports by Department Analysts.

Key Observations

- The 73 radiological events reported this quarter are the fewest reported in any quarter since the inception of this report.
- Eighty individuals were contaminated in the 73 reported radiological events, the fewest contaminated in any quarter.
- The number of radiological contamination events reported in 1998 (336) is the lowest annual total since the inception of this report.

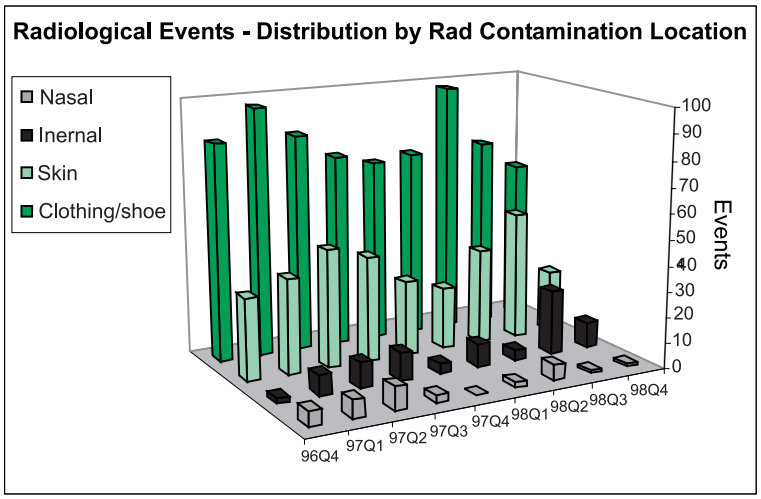
Distribution by Type of Activity

- No statistically significant change by type of activity has occurred over the past nine quarters.



Distribution by Radiological Contaminant Location

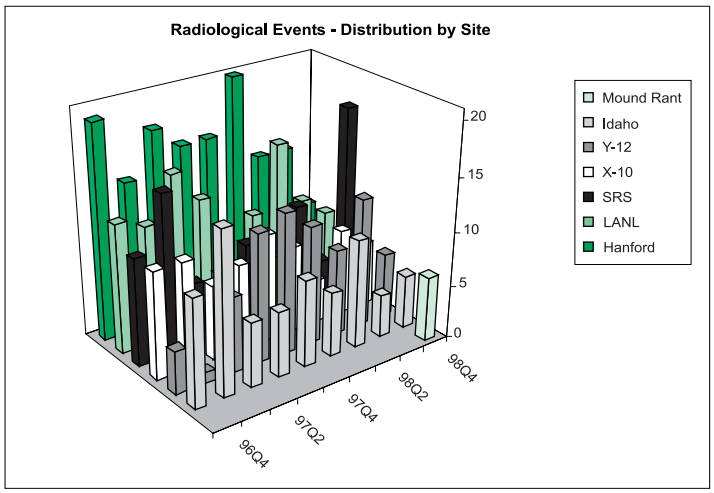
- The number of skin contaminations in 98Q4 (24) was the lowest reported in any quarter since this data was originally collected and analyzed in 96Q4. This represents a 35% decrease when compared to the previous 8-quarter average of 37 skin contaminations.



- Of the reports which mentioned the contaminant involved in the event, the predominant isotopes were Plutonium 238/239 (10 events), Cesium 137 (8 events), and Strontium 90 (5 events).
- There were 10 confirmed internal contaminations in 98Q4. Five of these uptakes happened at the Mound Plant and are attributed to site personnel retroactively applying Decision Level and Minimum Detectable Activities to bioassay data obtained prior to 1997.

Additional Analysis

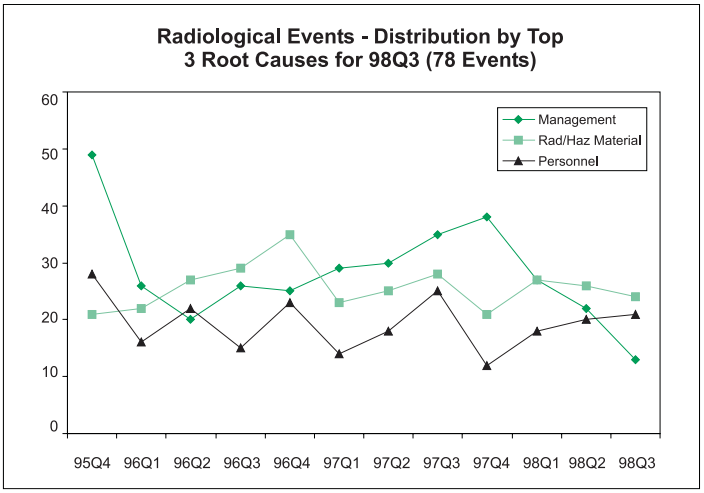
Distribution by Site



- Most sites reported fewer radiological events in 98Q4 when compared to the previous eight-quarter average. The one exception is the Mound Plant, which reported six events in this quarter compared to their eight-quarter average of less than one. As stated previously, this increase is due to a retroactive recalculation of historical internal uptakes.
- The Hanford Site typically reports the highest number of radiological events. For 98Q4, they reported only 7 events as compared to their average of 17 events for the previous eight quarters.

Distribution by Root Cause*

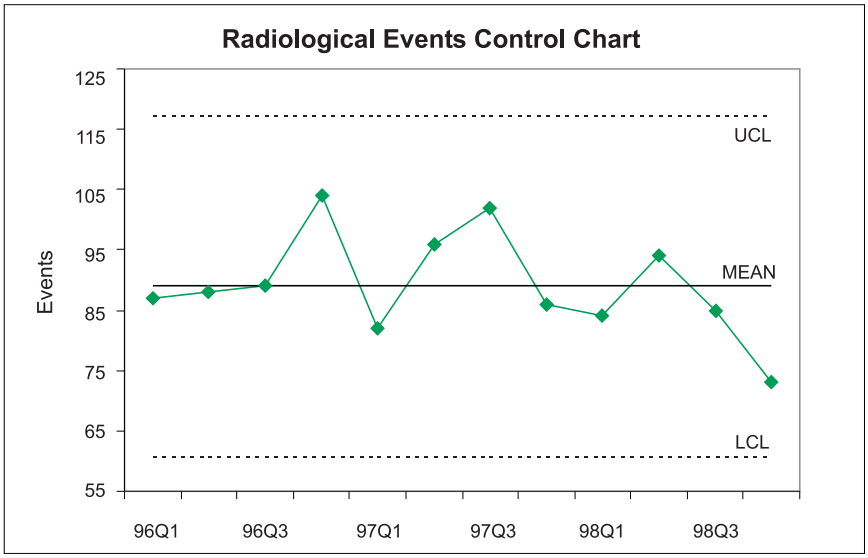
- The graph below depicts the trends in radiological events over the past 12 quarters by the three most prevalent causal factors.
- In the most recent quarter (98Q3), casual factors identified as Management dropped considerably, when compared to its previous eleven-quarter average of 31.



* Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

Statistical Process Control (SPC) Analysis

- The processes in place to prevent radiological events remains within statistical process control.

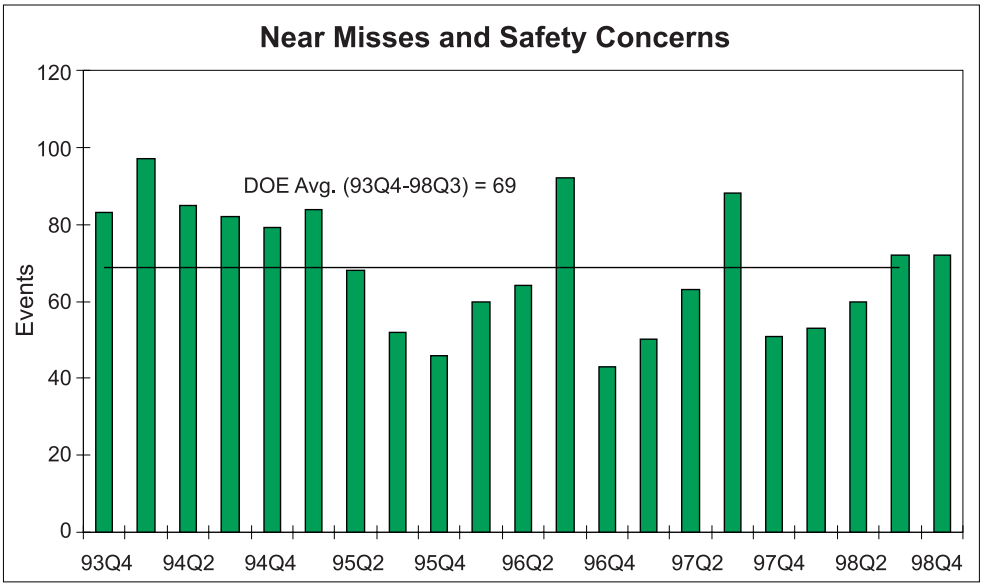


Indicator

12. Near Misses and Safety Concerns

Definition

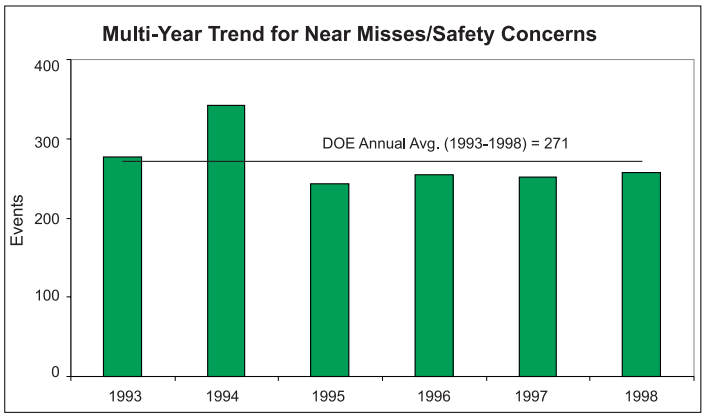
A near miss is an operational event where barriers to an accident have been compromised such that no barriers or only one barrier remain (e.g., lack of fall protection, electric shock without injury, unauthorized confined space entry). A safety concern includes: the unauthorized use of hazardous products or processes, or if work is shut down as a result of an OSHA violation. Near misses and safety concerns are reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.



Source: Review of Occurrence Reports by Department Analysts.

Key Observations

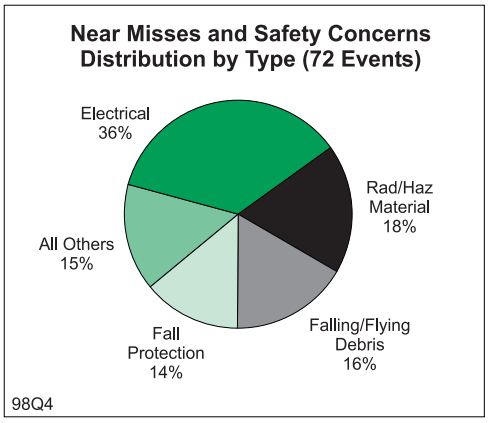
- Since 1995, DOE has shown no improvement in reducing the number of near miss and safety concern events.
- The 4-quarter cyclical trend in near miss and safety concern events was not evident in this quarter. The number of events did not decrease from the previous quarter as expected.
- Ten injuries occurred from these 72 events in 98Q4 with the severity ranging from bruises to a splintered calf bone. Injuries also included a laser eye overexposure, bullet debris wounds to a leg, lacerated arm wounds, second and third degree burns to a hand, fractured ribs, contusions, and leg injuries. Five electrical shocks occurred with no injuries.



- For the past 4 years, DOE has shown no improvement in reducing the number of near miss and safety concern events. Electrical-related events continue to dominate the near miss and safety concerns category (approximately 30-40 percent).

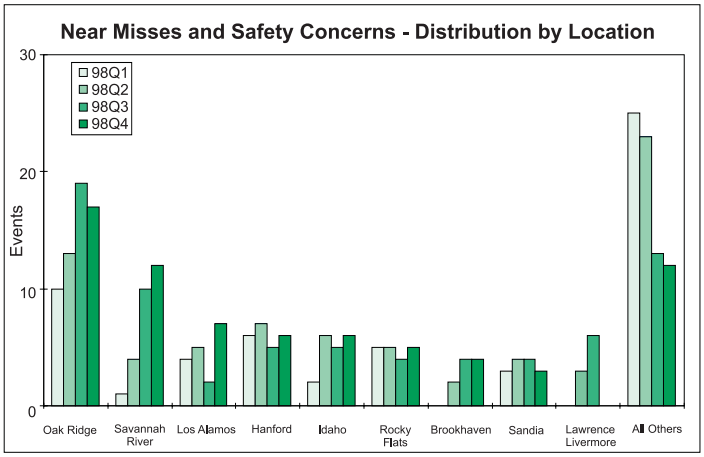
Distribution by Type of Hazard

- In 98Q4 and consistent with the entire year, 11 of the 26 Electrical-related events occurred because personnel did not follow work-safe practices and procedures while planning or performing electrical work activities. In one case, a technician received second and third degree burns to his right hand.
- Only 23 of the 72 events involved subcontractor workers (36); the remainder involved prime contractor workers (74) and two students.
- Only 6 events involved decontamination and decommissioning activities. None of these involved injuries.



Additional Analysis

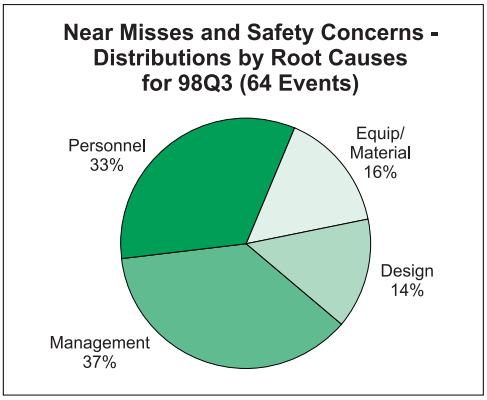
Distribution by Location



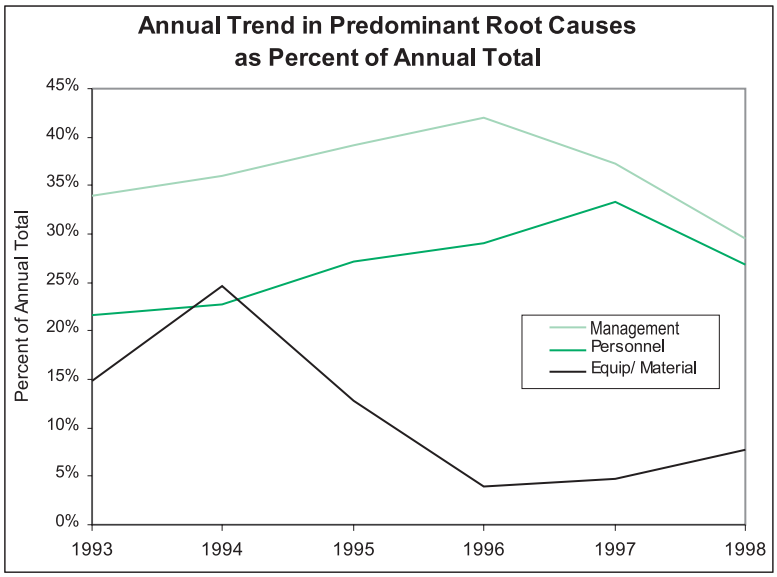
- Oak Ridge and Savannah River continue to exhibit high numbers of near misses and safety concerns and comprise the bulk of the events (40 percent).

Distribution by Root Cause*

- In 98Q3 and for the past year, Management Problems and Personnel Errors continue to be the predominant causal factors for most events.
- Specific management problems were evenly distributed between inadequate administrative control, work planning deficiencies, poor enforcement or dissemination of safety policies, and other unspecified management problems.
- The predominant personnel errors involved workers not using procedures or human error.



***** Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.



Note: Fourth quarter data not available for 1998; hence, percentages for 1998 are expected to slightly increase.

- Since 1994, equipment and material problems, as a root cause for events, have decreased significantly (less than 8% of the events when normalized to total number of events in each year) indicating improvement in selection and use of equipment and materials for work activities.
- Since 1993, Management and Personnel problems continue to be the dominant root causes for near miss and safety concern events; however, Management problems have shown some improvement since 1996.

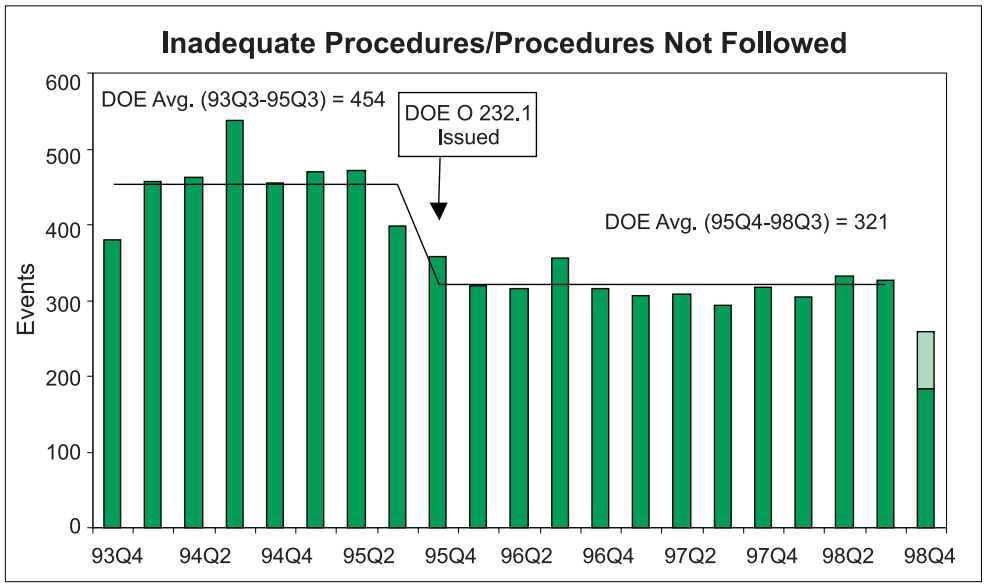
Additional Analysis

Indicator

13. Inadequate Procedures/Procedures Not Followed

Definition

Number of reportable events as defined in DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*, either categorized as procedure violations or problems, or reportable as being caused by a procedure violation or problem.



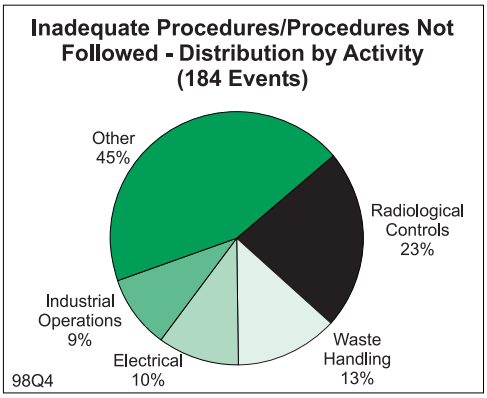
Source: Review of Occurrence Reports by Department Analysts.
NOTE: Extended portion at the top of 98Q4 depicts the estimated increase due to revisions and finalization of root causes of occurrences.

Key Observations

- Primarily due to the lower number of expected events in 98Q4, the number of reports in 1998 was slightly lower than the number reported in 1997 and the lowest number of reported events of any year. The average number of events per quarter was 305 in 1998 while this average was 306 in 1997 and 327 in 1996.
- In 98Q4, the Department experienced a significant decrease in the number of expected reported procedural-related events when compared to the previous quarter (21%) and a similar decrease when compared to the DOE average since the re-baselining experienced in 95Q4 (20%.)
- The drop observed in the number of reported procedural related events in 98Q4 corresponds to a similar drop in the overall number of occurrence reports over the same time frame (17%.)

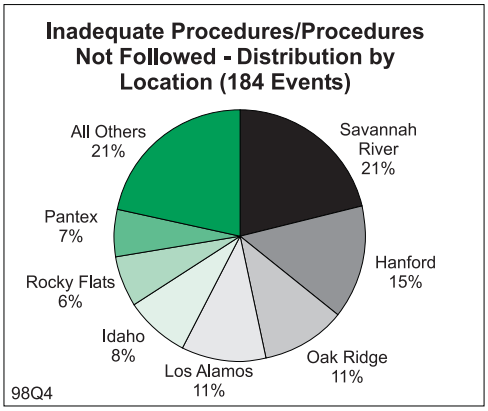
Additional Analysis

Distribution by Activity



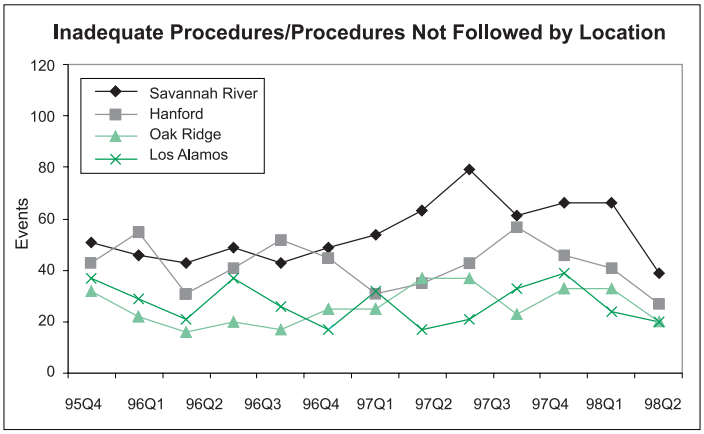
- Compared to 1997, the number of radcon related procedural events remained nearly constant. This takes into account expected changes in the numbers of events due to report finalization. The average number of events per quarter for 1997 was 71. In 1998 the average number per quarter was 69.
- As has been the case for the last 12 quarters, radiological controls (radcon) related procedures remained the leading contributor to the total number of procedural related events in 98Q4. Of significance is the fact that, even after taking into consideration the expected increase as reports become finalized, the total number of expected events dropped by 28% (69 events in 98Q3 and only 50 in 98Q4.) This is consistent with the overall drop observed in both the numbers of procedural related events as well as overall ORPS reports that were experienced this quarter.
- For the 42 radiological controls related procedural problems reported in 98Q4, 11 events, or 26%, involved posting/access requirements. This was also the leading problem last quarter. Inadequate or inappropriate work controls/training was the cited problem for 10 events while contaminated tools and equipment maintenance accounted for another 9 events. Overall, of the 42 events reported, 11 resulted in the spread of contamination to personnel in the form of contaminated skin, and clothing.

Distribution by Location



- When comparing 1997 to 1998, all the sites remained nearly consistent (within 10%.) The only exceptions were experienced at Los Alamos, whose quarterly average rose from 22 events in 1997 to 29 events in 1998, and Rocky Flats, whose quarterly average dropped from 29 events in 1997 to 22 events in 1998.
- As was the case in 98Q3, Savannah River, Hanford, Oak Ridge and Los Alamos were the 4 top contributing sites in 98Q4 (39, 27, 20, and 20 events respectively.) These 4 sites have been among the top contributors consistently over the last 11 quarters.

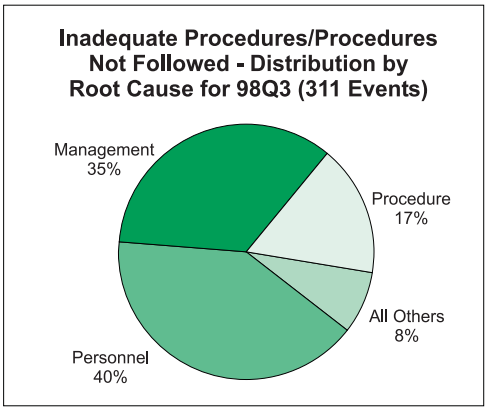
- By facility: at Savannah River, the majority of events occurred at 3 facilities including, F Canyon (6 events,) the In Tank Precipitation Facility (5 events,) and H Canyon (4 events.) At Hanford, one-third of the events (9 events) occurred at the 222-S Analytical Laboratory, while at Oak Ridge, X-10 accounted for 7 of the reported 20 events. Lastly, at the Los Alamos TA-55 Plutonium Processing and Handling Facility accounted for 6 of the 20 reported events.



- As indicated by the above graph, all 4 of the top contributing sites showed a noticeable decrease in 98Q3. This was also the case when taking into consideration expected changes due to report finalization.

Distribution by Root Cause*

- Of the 327 events reported in 98Q3, 311 (95%) had root causes established at the time that these analyses were performed. Consistent with the previous quarters in 1998, the three most common root cause categories were personnel, management and procedure.



- The root cause for 126 of the procedural related events was identified as personnel error. The largest sub-category of personnel error was inattention to detail (56 events.) The second largest sub-category was procedure not used or used incorrectly (49 events.) This is a reversal of last quarter's results that identified procedure not used or used incorrectly as the leading sub-category with 78 events and inattention to detail as the second leading sub-category with 56 events.
- Management problems were cited as the root cause for 109 events in 98Q3. Consistent with 98Q2, policy not adequately defined, disseminated or enforced (36 events,) inadequate administrative controls (30 events,) and work organization/

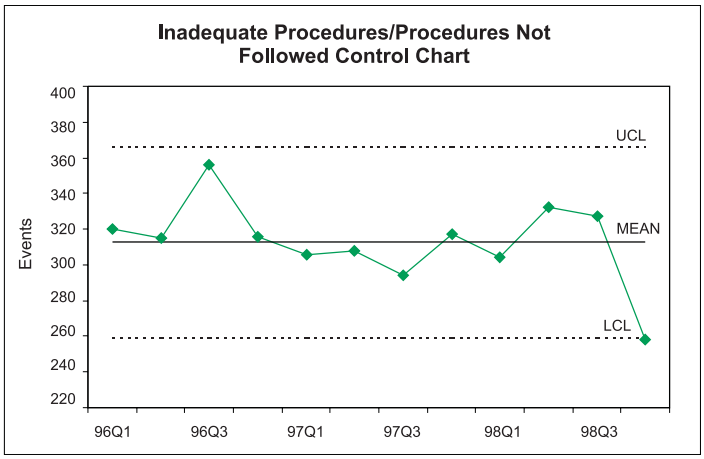
* Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

planning deficiency (25 events) were the top 3 leading sub-categories of management problem.

- Procedure problems were cited as the root cause for 52 events in 98Q3. Of these, 46 events cited defective or inadequate procedure as the sub-category with the remainder being due to lack of procedures.

Statistical Process Control (SPC) Analysis

- The decrease in the number of expected events in 98Q4 (258 events) fell close to the lower control limit for the expected statistical process control.
- Discussions with field representatives at two of the sites reporting a majority of the procedural related events also indicate a possible trend toward reducing the numbers of procedural reports submitted through ORPS.

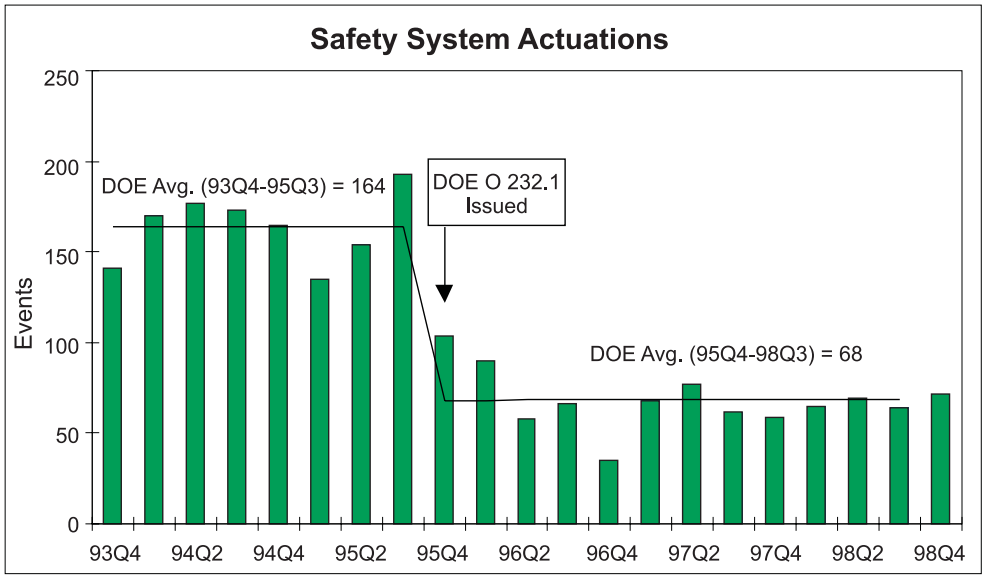


Indicator

14. Safety System Actuations

Definition

Number of operations-related events determined to be safety system actuations reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*. This includes real actuations of any safety-class equipment or alarm, unplanned electrical outages, unplanned outages of service systems, serious disruptions of facility activity related to weather phenomena, facility evacuations, or losses of process ventilation. These events have the potential to impact the safety and health of workers in the vicinity.

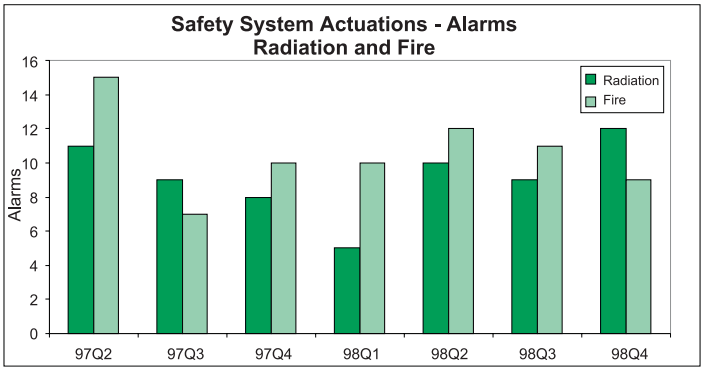


Source: Review of Occurrence Reports by Department Analysts.

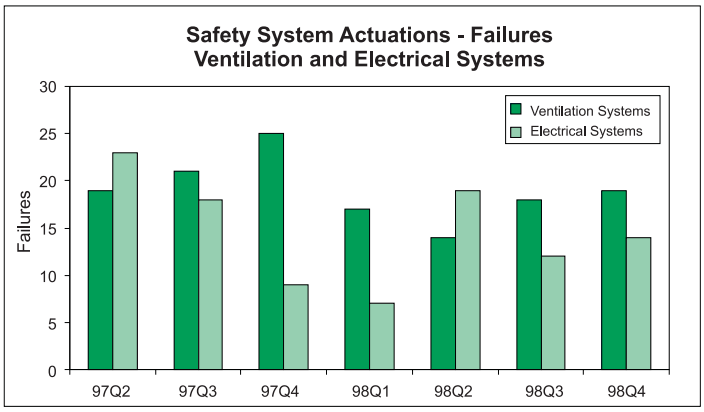
Key Observations

- The number of safety system actions events has remained relative constant since this indicator was re-baselined in 95Q4. In 1998 there were 269 safety system actuation events as compared to 266 in 1997 and 249 in 1996.
- The number of safety system actuation events reported in 98Q4 (72) is consistent with the average number of actuation events reported since full implementation of DOE O 232.1 in 95Q4.
- In 98Q4 there were three events categorized as emergency events. Two events were at the Y-12 site and involved a fire in an overhead crane and a release of sulfuric acid from a storage tank. The third event was at Brookhaven National Laboratory and involved a release of hydrogen chloride gas.

Distribution by Type of Alarm

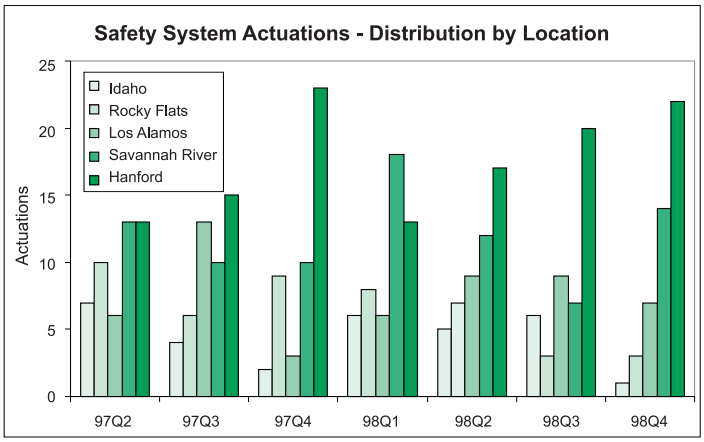


- System failures also constitute a portion of the safety system actuations reported in 98Q4. The primary failures occur in process ventilation (19) and electrical systems (14).
- The increase in electrical system failures in the second and third quarters of each calendar year is largely attributed to increased thunderstorm activity with resultant lightning induced power failures. Weather phenomenon was a factor in only 2 of the reported safety system actuations in 98Q4.
- Four of the fourteen electrical outages in 98Q4 were attributed to a single light airplane that severed a 230 kV electrical supply line at the Hanford Site. This resulted in 4 separate electrical outages that affected various facilities at the site.



Additional Analysis

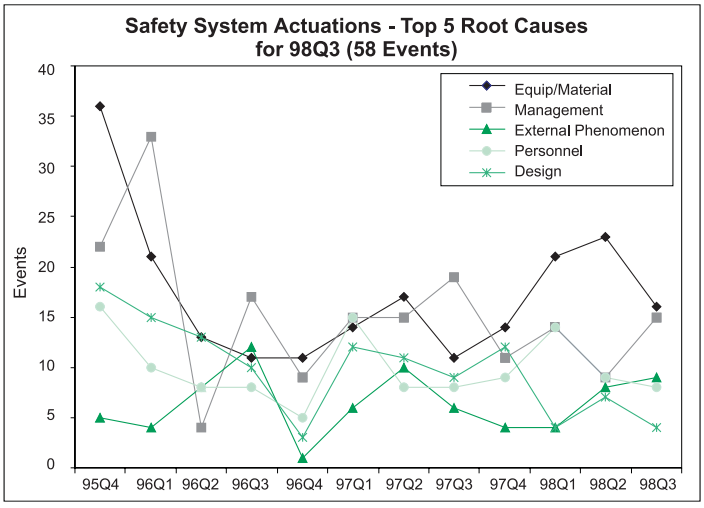
Distribution by Location



- The number of safety system actuations reported by the Hanford site is consistently higher than that of any other site in the DOE Complex. Ventilation system failures that serve a confinement function account for most of the Hanford safety system actuations in 98Q4 (15). Worthy of note, Idaho reported only one safety system actuation event in 98Q4, considerably below their previous six-quarter average of five.

Distribution by Root Cause*

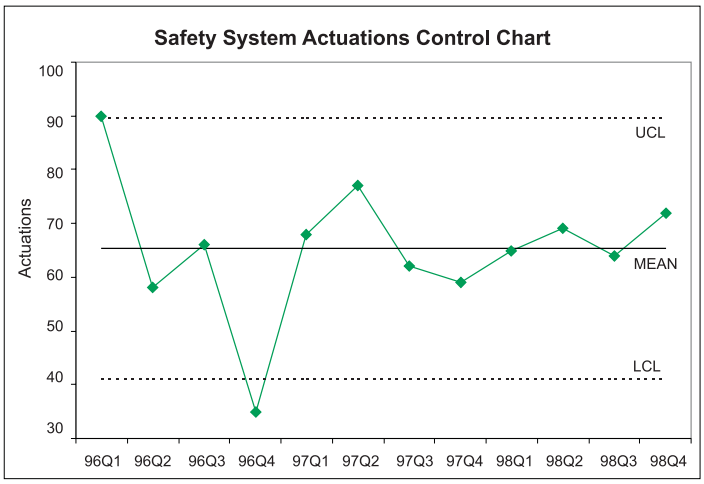
- The graph below depicts the trends in safety system actuations over the past 12 quarters by the five most prevalent casual factors.
- The decreasing trend in design causal factors and the continued high percentage of equipment/material casual factors suggests that the Department is not installing new equipment or material and is experiencing more end-of-life related failures of existing equipment or material.
- The seasonal trend in external phenomena casual factors, due to lightning strikes and resultant loss of power in the 2nd and 3rd quarters of each calendar year, is evident.



***** Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

Statistical Process Control (SPC) Analysis

- The 96Q4 data point is being treated as an outlier. The processes affecting safety system actuation events remain in statistical process control.



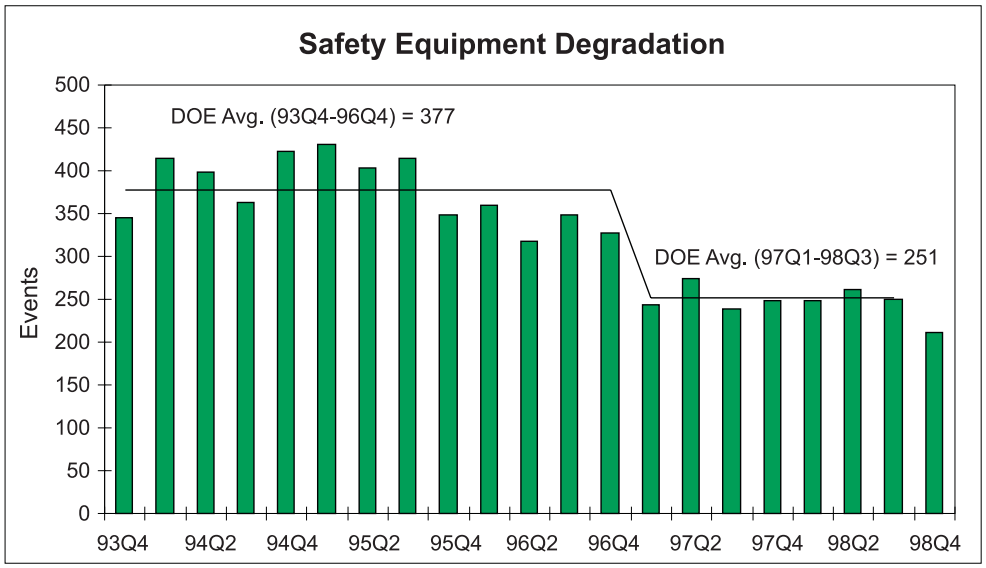
Indicator

15. Safety Equipment Degradation

Definition

Number of reportable events categorized as "vital system/component degradation" as defined in DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.

Safety equipment degradation includes: (1) any unplanned occurrence that results in the safety status or the authorization basis of a facility or process being seriously degraded; or (2) a deficiency such that a structure, system, or component (SSC) vital to safety or program performance does not conform to stated criteria and cannot perform its intended function; or (3) unsatisfactory surveillances/inspections and appraisal findings of any safety SSC.



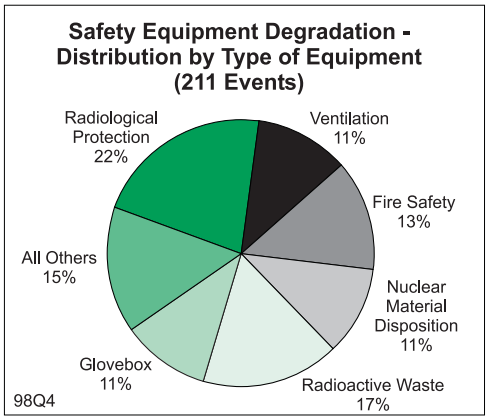
Source: Review of Occurrence Reports by Department Analysts.

Key Observations

- 1998 had the fewest reported events of any year. The average number of events per quarter was 241 in 1998 while this average was 251 in 1997 and 339 in 1996.
- In 98Q4, the number of reported safety equipment degradation events (211) decreased over 16% when compared to the previous quarter. The single largest contributor to reportable degradation events is radiological protection related equipment.
- The decrease in 98Q4 supports the re-baselining performed last quarter. This re-baselining of safety equipment degradation events took place in response to the decrease in site-wide reporting of these events at Rocky Flats.

Additional Analysis

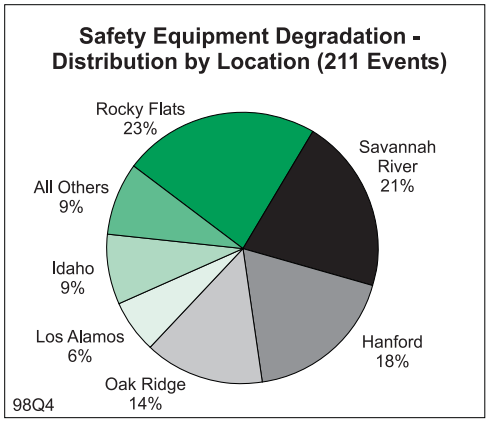
Distribution by Type of Equipment



- Radiological protection related equipment was the largest contributor to safety equipment degradation in 1998 (24%.) The other major equipment failures for the year were in ventilation (13%,) fire protection (12%,) and nuclear material disposition (11%) related systems.
- For the eighth consecutive quarter, radiological protection related equipment represented the single largest type of degraded safety equipment. Of these 46 events, nearly half (19 events) involved failures associated with continuous air monitoring (CAM) equipment. Other significant contributors included criticality detection related equipment (8 events) and general area radiation detection equipment (7 events).
- Radioactive waste storage, process, and handling related equipment replaced ventilation equipment as the second largest contributor in 98Q4 (35 events.) For this type of equipment, waste tank instrumentation and monitoring equipment was the leading equipment type (14 events.) Storage (11 events) and handling (10 events) equipment made up the balance of these types of events.
- Fire safety equipment also played a significant role in 98Q4 (28 events.) 25% of these events were related to failures of fire alarm equipment. For the rest of these degradation events, a variety of failures included lack of adequate system coverage (5 events), failures of fire/smoke/heat monitoring equipment (4 events), and failed sprinkler heads and associated valving and piping (4 events) among others.

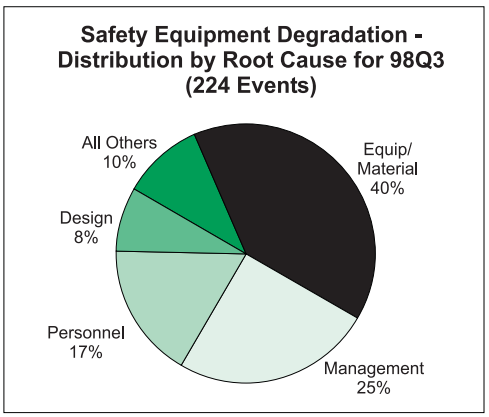
Distribution by Location

- Rocky Flats (49 events) and Savannah River (44 events) have been the top contributors for the last 8 quarters. Hanford was also a significant contributor this quarter with 39 events.
- The number of events at Rocky Flats decreased from 67 events in 98Q3 to 49 events in 98Q4. This decrease is primarily attributable to the decrease in nuclear material disposition related equipment failures (14 in 98Q3 down to 8 in 98Q4) and fire protection related equipment degradations (9 in 98Q3 down to 3 in 98Q4.)
- Savannah River showed a similar decrease in the number of reported safety equipment degradation events from 98Q3 (58 events) to 98Q4 (44 events.) This decrease is related to the decrease in radiation protection equipment failures (17 in 98Q3 down to 7 in 98Q4) and ventilation system failures (9 in 98Q3 down to 3 in 98Q4.)



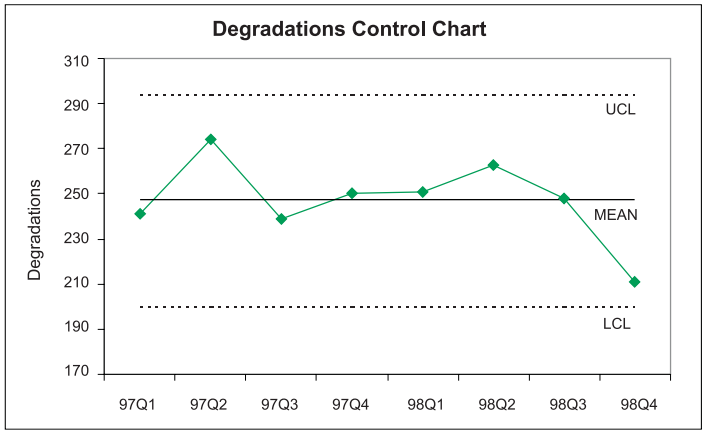
Distribution by Root Cause*

- Of the 250 events reported in 98Q3, 224 (90%) had root causes established at the time of this report. Consistent with the previous quarters in 1998, the three most common root cause categories were problems with equipment/material, management, and personnel.
- The root cause for 89 of the safety equipment degradation events was identified as equipment/material problems. Consistent with 98Q2, the two most significant sub-categories were defective or failed parts (60 events) and end of life failures (23 events.)
- Management problems were cited as the root cause for 56 events in 98Q3. There was, however, a notable change in the distribution of this root cause category. There was a significant drop in the number of events where the root cause was policy not adequately defined, disseminated, or enforced (29.4% in 98Q2 down to 12.5% in 98Q3.)



Statistical Process Control (SPC) Analysis

- The processes for preventing safety equipment degradation events remains in statistical process control.



*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

This page intentionally left blank.

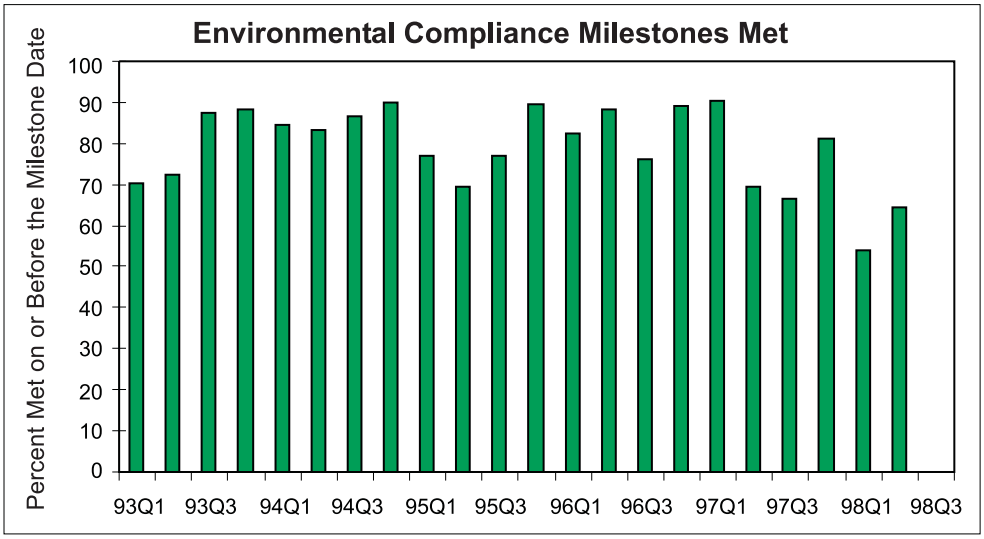
Indicator

16. Environmental Compliance Milestones Met

Definition

Enforceable requirements in environmental agreements met on or before the milestone date (percent).

No change to this section since last report.



Source: Office of Environmental Management; Progress Tracking System Data.

Key Observations

- An average of the most recent 5 quarters indicates DOE is missing an increasing number of enforceable compliance deadlines when compared to past performance. To date in fiscal year 1998, DOE has met only two-thirds of its enforceable milestones.

Additional Analysis

- In 98Q1 and 98Q2, DOE met only 54% and 64% of its enforceable milestones; significantly worse performance than most previous quarters.
- These data do not capture all enforceable milestones. They reflect only those milestones under the purview of the Office of Environmental Management. EM's Progress Tracking System is believed to capture 85-90 percent of all DOE enforceable environmental milestones.

This page intentionally left blank.

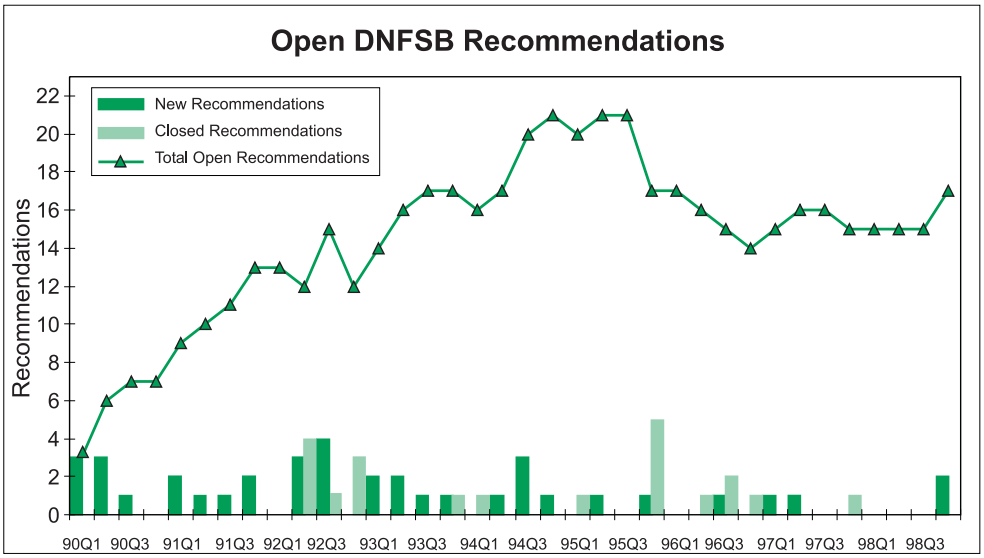
Indicator

17. Open DNFSB Recommendations

Definition

Cumulative number of open Defense Nuclear Facilities Safety Board (DNFSB) recommendations. DNFSB recommendations only apply to DOE defense nuclear facilities and, therefore, are representative only of DOE defense facilities.

Each DNFSB recommendation accepted by DOE leads to an implementation plan containing a set of commitments which, when fully implemented, will resolve the safety issues and lead to closure of the recommendation. A commitment is any documented obligation by the Secretary, or designee, that describes products to be delivered on a specified schedule. Commitments resulting from DNFSB recommendations are tracked by the Office of the Department Representative to the DNFSB (S-3.1) as completed (fulfilled), not yet due, and overdue.



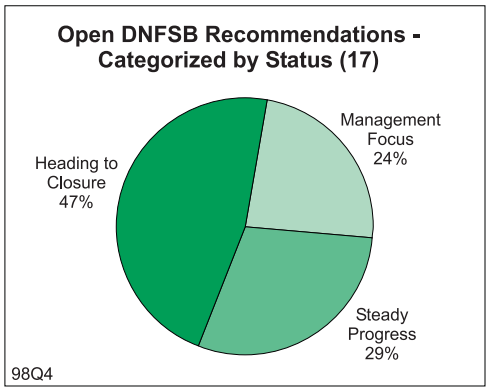
Source: Safety Issues Management System (SIMS)

Key Observations

- As of December 1998, there were 17 open DNFSB recommendations representing 537 DOE commitments. Of the 537 commitments, 353 (66%) were completed, 128 (23%) were open and not yet due, and 56 (11%) were open and overdue. A total of 60 commitments were completed over the past quarter.
- Of the 17 Recommendations, two were accepted by DOE in 98Q4, but Implementation Plans and associated commitments were not developed as of December 1998; 98-1, *Resolution of Internal Oversight Findings*, and 98-2, *Integrated Safety Management at Pantex*.
- The number of commitments for this quarter decreased significantly due to revision and re-baselining of the Department's 94-1 Implementation Plan, *Improved Schedule for Remediation*, on November 20, 1998. The number of commitments will increase when the implementation plans for Recommendations 98-1 and 98-2 are developed and approved.

Characterization of Recommendation Status

- This chart shows an evaluation by S-3.1 on the number of open DNFSB recommendations categorized by recommendation status. A status of "Heading to Closure" includes the existence of a clearly defined path to closure, and the expectation that the remaining commitments/actions can be completed within the next year. "Steady Progress" implies the existence of an acceptable implementation plan with most commitments/deliverables generally being completed on schedule. Recommendations classified as "Management Focus" involve difficulties with (or lack of) an implementation plan or a large number (8) of overdue commitments.



  - During this quarter, two recommendations, 98-1 and 98-2, were added to the Management Focus list, pending development of implementation plans by the Secretary. Once implementation plans have been accepted, commitments will be tracked to completion in future quarters.
  - Recommendation 93-3, *Improving Technical Capability,* continues to remain on the Management Focus list as little progress has been made in meeting implementation plan commitments.
  - The Office of Environmental Management completed a comprehensive revision to the 94-1 implementation plan, on December 28, 1998.

Additional Analysis

Distribution of Open Commitments

Office	DNFSB Recommendations	Commitments	Complete		Not Yet Due		Overdue		Open	
EM	7	303	184	61%	102	34%	17	6%	119	39%
DP	4	131	108	82%	15	11%	8	6%	23	18%
DP (98-2)	1*	0	0	0	0	0	0	0	0	0
EH	2	21	16	76%	1	5%	4	19%	5	24%
EH (98-1)	1*	0	0	0	0	0	0	0	0	0
HR	1	75	38	51%	10	13%	27	36%	37	49%
NE	1	7	7	100%	0	0%	0	0%	0	0%
DOE	17	537	353	66%	128	24%	56	10%	184	34%

NOTE: % is percentage of total commitments for that office. 98-1 and 98-2 do not have established commitments at this time; hence, the zero values for commitment, complete, not yet due, overdue and open table items.

- The table above provides an overview of the status of commitments to DNFSB recommendations. The Office of Environmental Management and Management and Administration continue to have the majority of overdue commitments (79% of 56 overdue commitments).
- The total number of overdue commitments decreased since 98Q3 due to re-baselining of the revised implementation plan for Recommendation 94-1.
- In 98Q4, following completion of its commitments, Recommendation 92-4, *Hanford Multi-Function Waste Tank Facility*, was added to the list of three other recommendations awaiting closure by the DNFSB.

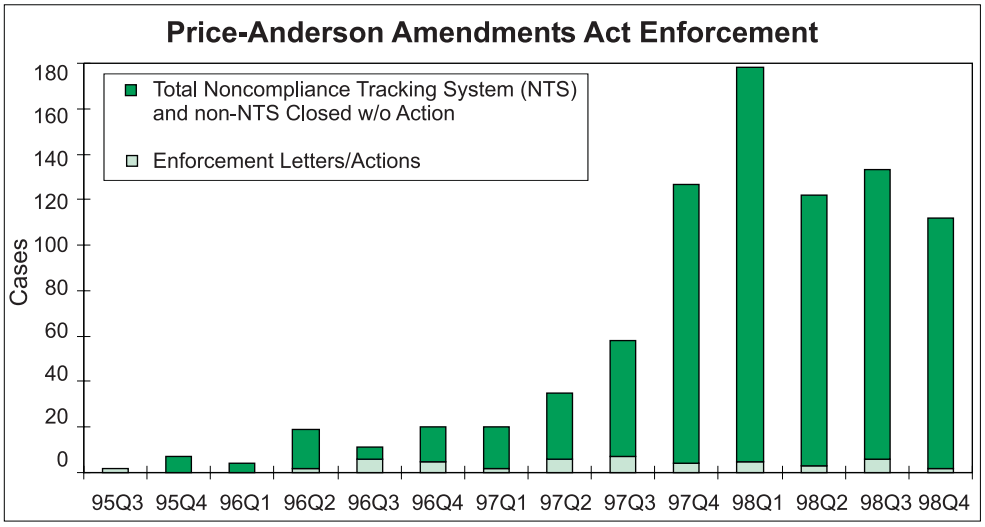
This page intentionally left blank

Indicator

18. Price-Anderson Amendments Act Enforcement

Definition

Total number of cases the Price-Anderson Amendments Act[a] (PAAA) Enforcement Office reviews per quarter.



Source: Office of Enforcement and Investigation Database.

Key Observations

- The PAAA, Office of Enforcement and Investigation closed 110 reports without action in 98Q4 and issued two Preliminary Notices of Violation (PNOVs)[1] with civil penalties totaling $288,750.
- In 1998, the PAAA Enforcement Office closed 529 reports without enforcement action. In addition, 12 PNOVs totaling $1,135,000 ($425,625 waived due to a statutory exemption for laboratories), 8 Enforcement Letters and 1 Consent Order for $100,000 were issued.

Additional Analysis

- On November 16, 1998, Lockheed Martin Energy Research Company received a PNOV with a civil penalty of $123,750 for work process and quality improvement deficiencies for a number of events at the Oak Ridge High Flux Isotope Reactor.
- Also on November 16, Babcock & Wilcox of Ohio, Inc. received a PNOV with a civil penalty of $165,000 for a number of deficiencies at the Mound Site. The PNOV cited problems with radiological work controls, the bioassay program, and the corrective actions to remedy those deficiencies.

[a] 10CFR Parts 830.120, 835, 820.11. Severity Levels are defined in Appendix A, Section VI, as amended, to 10CFR Part 820.

[1] DOE weighs several issues when deciding to issue a PNOV with a civil penalty or when considering the amount of the civil penalty: (1) the safety significance of the noncompliance, (2) initiative by the contractor in identifying and reporting the noncompliance, and (3) the timeliness and effectiveness of corrective actions.

- Of the 110 cases closed without action by the PAAA Enforcement Office in 98Q4, 30 (27%) were self-identified by the responsible contractor via the Noncompliance Tracking System (NTS) and 80 (73%) were identified independently by the PAAA Enforcement Office.
- Five NTS reports relating to Enforcement Actions were closed in 98Q4.
- On November 24, 1998, the PAAA Enforcement Office issued a memorandum to the DOE and contractor community announcing an expanded focus, beginning April 1, 1999, on PAAA enforcement actions related to DOE contractor internal dose evaluation programs. This memorandum was prompted by a series of deficiencies identified in the contractors' internal dose evaluation programs, which resulted in enforcement actions being taken during 1997 and 1998 at five DOE contractor facilities. For 120 days, the Office of Enforcement and Investigation plans to exercise enforcement discretion for problems identified with internal dose evaluation programs, provided that the problems are identified by the contractor and are reported into the NTS as appropriate, and corrective actions are planned, reported and implemented per a reasonable schedule.

Indicator

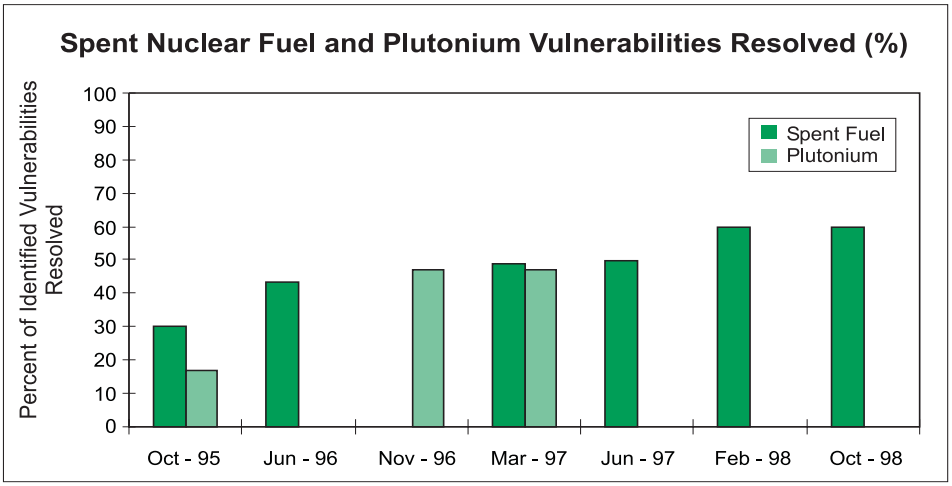
19. Spent Nuclear Fuel and Plutonium Vulnerabilities Resolved

Definition

Number of resolved plutonium and spent fuel vulnerabilities divided by the total number of vulnerabilities as defined in *Spent Fuel Working Group Report on Inventory and Storage of the Department's Spent Nuclear Fuel…and Their Environmental, Safety, and Health Vulnerabilities*, Volume 1, November 1993, and *Plutonium Working Group Report on Environmental, Safety, and Health Vulnerabilities*, Volume 1, November 1994 (DOE/EH-0415).

No updated Plutonium data during the last three reporting periods.

An ES&H vulnerability is defined in the plutonium and spent fuel vulnerability reports as "conditions or weaknesses that could lead to unnecessary or increased radiation exposure of workers, release of radioactive material to the environment or radiation exposure to the public." A resolved vulnerability implies that the cited condition no longer exists, the risk has been minimized to an acceptable level, or the risk has been evaluated at an active facility and judged to be acceptable. Vulnerabilities can be characterized as material/packaging (e.g., storage of unstable and corrosive solutions), facility condition (e.g., facility weakness), or institutional (e.g., loss of experienced personnel) vulnerabilities. The vulnerabilities were ranked by significance based on the likelihood of an accident and the perceived consequences.



Source: EM-66, Draft Plutonium Vulnerability Management Summary Report; EM-67, Report on Status of Corrective Actions to Resolve Spent Nuclear Fuel Vulnerabilities.

Key Observations

- There were 299 plutonium vulnerabilities identified at 13 sites and 106 spent nuclear fuel vulnerabilities identified at 8 sites based on reports issued in 1993 and 1994.
- The most spent nuclear fuel vulnerabilities (34 percent) were identified at Hanford, which currently maintains 86 percent of the DOE total spent nuclear fuel inventory by weight.
- No spent fuel vulnerabilities have been identified as being resolved since February 1998.

Additional Analysis

- There were 536 identified corrective actions for the 106 spent nuclear fuel vulnerabilities. Of these 536 corrective actions, 449 (84 percent) have been completed.

Table 1

Spent Nuclear Fuel Site	Vulnerabilities Identified	Vulnerabilities Resolved	Percent Resolved
Hanford	36	23	64%
Idaho	33	11	33%
Savannah River	21	19	90%
All Others	16	11	69%
Total	**106**	**64**	**60%**

- The table above (Table 1) indicates the breakdown of spent nuclear fuel vulnerabilities as of 97Q2 by location and the progress in resolving the identified vulnerabilities.

Table 2

Plutonium Site	Vulnerabilities Identified	Vulnerabilities Resolved	Percent Resolved
Rocky Flats	87	33	38%
Los Alamos	60	41	68%
Savannah River	40	10	25%
Hanford	34	9	26%
All Others	78	47	60%
Total	**299**	**140**	**47%**

Vulnerability resolution status has been updated for this report from the Draft Plutonium Working Group dated March 1997.

- The most plutonium vulnerabilities (87) were identified at Rocky Flats, which maintains 80 percent of the DOE total plutonium inventory by weight. Of these 87 vulnerabilities, 15 have been eliminated and an additional 18 have had the risk reduced to an acceptable level.
- Los Alamos had similar results in closing plutonium vulnerabilities with 14 vulnerabilities eliminated and the risk in 27 other issues reduced to an acceptable level.
- Fifteen of the top 46 highest risk plutonium vulnerabilities, DOE-wide, have been resolved. Seven of the highest plutonium vulnerabilities were eliminated; the risk for 8 other vulnerabilities has been reduced to an acceptable level.
- The above table (Table 2) indicates the breakdown of plutonium vulnerabilities as of 97Q1 by location and the progress of resolving the identified vulnerabilities.

Indicator

20. HEU Vulnerabilities Resolved

Definition

Percentage of vulnerabilities identified in the *Highly Enriched Uranium Working Group Report on Environmental, Safety and Health Vulnerabilities Associated with the Department's Storage of Highly Enriched Uranium* (DOE/EH-0525) that have been resolved.

An ES&H vulnerability is defined in the HEU Working Group Report as "conditions or weaknesses that could result in the exposure of workers or the public to radiation, or in releases of radioactive materials to the environment."

This indicator will be used to measure the progress in resolving the total of 155 ES&H vulnerabilities found in the assessment, and also specific subsets of these vulnerabilities: 1) the facility and material condition vulnerabilities ranked by the HEU Working Group as being of highest significance, 2) vulnerabilities at specific sites, and 3) vulnerabilities involving U-233.

A significant fraction of the HEU Working Group's assessment involved U-233, stemming from this isotope's particular radiological properties (and those of U-232 co-produced with U-233). The HEU Working Group concluded that a special management plan is needed for safe interim storage of U-233 materials. Thus, U-233 vulnerabilities will be tracked as a separate group, even though this will involve "double counting" of some vulnerabilities ranked as having the highest significance and/or grouped in the "Total, DOE-wide" category.

Key Observations

HEU Vulnerablity Set	Vulnerabilities Identified	Vulnerabilities Resolved	P.I.= % Resolved
Total, DOE-Wide	155	55	33%
Highest Significance	21	5	24%
U-233 Vulnerabilities	14	2	15%

The table above summarizes the Department-wide status of HEU vulnerability resolution including the subsets of Highest Significance and U-233 Vulnerabilities:

- Fifty-five HEU vulnerabilities were resolved through 98Q1 as part of the DNFSB Recommendation 97-1 Implementation Plan actions, the HEU Vulnerability Management Plan, and/or Site-Specific HEU Management Plans.

The following table summarizes vulnerabilities on a site basis for 98Q2. Note that Oak Ridge Y-12 Plant stores a far greater amount of HEU (greater than 189 metric tons) than any other site. Also note that Oak Ridge National Laboratory and Idaho National Environmental Engineering Laboratory have the largest quantities of U-233 as shown in parentheses (424 and 351.6 kilograms, respectively). Actual inventories of U-233 are classified in cases where exact amounts are not shown.

HEU Site	HEU Inventory*	Vulnerabilities Identified	Vulnerabilities Resolved	P.I.= % Resolved
Oak Ridge Y-12 Plant	>189.0	49	13	27%
Rock Flats Env. Tech Site	6.7	28	8	29%
Los Alamos National Lab	3.2 (>1.0)	19	2	11%
Portsmouth Gaseous Diffusion Plant	22.0	16	7	44%
Idaho Nat. Engineering & Environmental Lab	>1.0 (351.6)	10	9	90%
Savannah River Site	13.8	9	4	44%
Oak Ridge K-25 Site	1.5	9	5	56%
Oak Ridge National Lab	1.2 (424.0)	6	1	17%
Pantex Plant	16.7**	5	3	60%
Sandia National Laboratories	<1.0	1	——	—
Argonne National Lab-West	<10.0	1	1	100%
Lawrence Livermore National Lab	<1.0 (3.1)	1	——	—
New Brunswick Laboratory	<1.0	1	1	100%

* Inventory of HEU produced in metric tons and U-233 in kilograms (shown in parentheses).

**Includes planned dismantlement.

Additional Analysis

- Led by the Office of Defense Programs (DP), DOE developed the HEU Vulnerability Management Plan, issued on June 13, 1997 by DP-1, that outlines a process for corrective actions and resolution of the HEU vulnerabilities. DP will track the resolution of the HEU vulnerabilities and report these either by a separate quarterly status report, or by information included in status reports that combine HEU vulnerability resolution with those for plutonium and/or spent nuclear fuel vulnerabilities. Moreover, the HEU Vulnerability Management Plan sets dates for resolution of the rest of the 16 HEU vulnerabilities (five have been resolved) designated by the HEU Working Group as being the highest significance. Thus, tracking of the PIs for these vulnerabilities can be shown against scheduled completion dates.
- The resolution of the other 100 HEU vulnerabilities identified in the HEU Vulnerability Assessment will depend on site-specific plans. Because of the need to work with separate Field Offices, scheduling and tracking of PIs concerning the other 100 vulnerabilities will take more effort and time to perform than those explicitly covered in the HEU Management Plan.

This page intentionally left blank.

Indicator

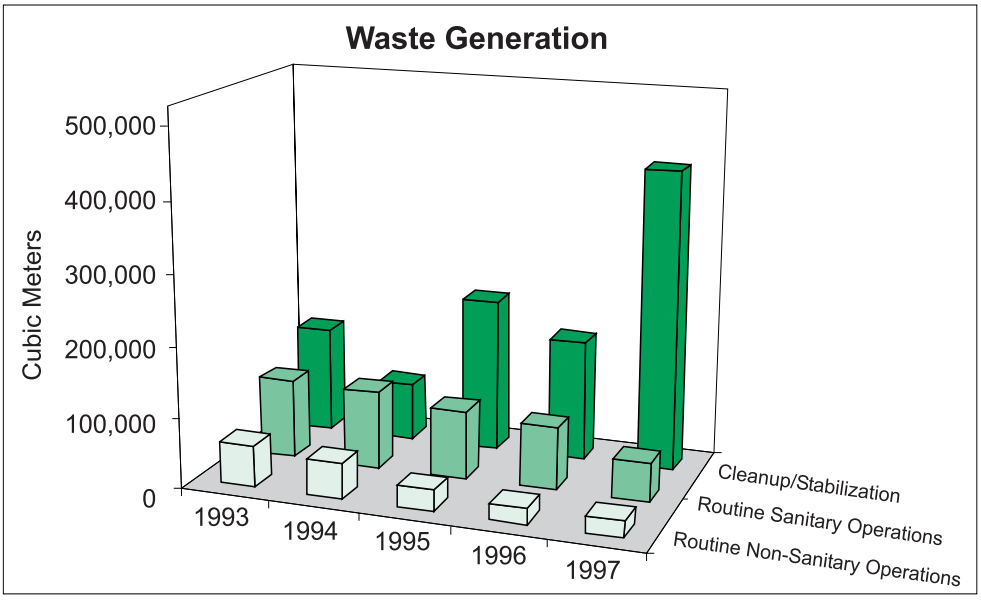
21. Waste Generation

Definition

Total amount of waste generated, in cubic meters, for all DOE sites. Generated waste types include: High-Level Radioactive, Transuranic, Low-Level Radioactive, Low-Level Mixed Hazardous, and Sanitary. These waste types are generated during routine operations or cleanup/stabilization activities.

Routine operations waste consists of normal operations waste produced by any type of production operation; analytical and/or research and development laboratory operations, treatment, storage and disposal operations; "work for others;" or any other periodic or recurring work that is considered ongoing in nature.

Cleanup/stabilization waste, including primary and secondary waste, is generated by the environmental restoration of contaminated media (soil, groundwater, surface water, sediments, etc.), stabilization of nuclear and non-nuclear (chemical) materials, and deactivation and decommissioning of facilities.



Source: *Office of Pollution Prevention, Office of Environmental Management, Annual Report of Waste Generation and Pollution Prevention Progress 1997.*

Key Observations

- DOE has achieved its Complex-Wide Waste Reduction Goals for routine operations based upon a comparison of 1997 waste generation to the 1993 baseline. However, it is important to note that increases in low-level radioactive waste generation could reverse this achievement.
- Excluding sanitary waste, routine operations waste generation increased three percent from 1996 to 1997, and decreased 61 percent overall from 1993 to 1997.
- In 1997, the DOE Complex generated approximately 503,700 cubic meters of waste. Most of the Complex's waste was generated by cleanup/stabilization activities (84%).
- Waste from cleanup/stabilization activities increased 147 percent from 1996 to 1997 due to contaminated soil removal and disposal, and decommissioning activities.

The tables below subcategorize waste generation based on production source: routine or cleanup/stabilization activities.

Waste Generated During Routine Activities (cubic meters)

Waste Type	1993	1994	1995	1996	1997
High-Level Radioactive	1,708	2,071	2,496	2,670	1,994
Transuranic	709	546	339	302	267
Low-Level Radioactive	40,856	31,868	21,896	15,053	16,533
Low-Level Mixed	3,331	3,133	1,338	1,371	1,373
Hazardous	12,430	12,507	4,103	3,063	2,880
Total excluding Sanitary Waste	59,034	50,125	30,172	22,459	23,047
Sanitary*	112,386	110,305	96,891	88,939	55,590
Grand Total	171,420	160,430	127,063	111,398	78,637

- High-level and transuranic waste accounted for less than three percent of the Complex-wide waste generated during routine activities.
- Sanitary waste constituted 71 percent of the total waste generated during routine activities.

Waste Generated During Cleanup/Stabilization Activities (cubic meters)

Waste Type	1993	1994	1995	1996	1997
High Level Radioactive	0	0	0	0	0
Transuranic	458	214	156	202	119
Low-Level Radioactive	88,161	42,604	86,847	64,971	326,574
Low-Level Mixed	45,333	14,039	4,616	2,132	2,168
Hazardous	31,029	8,900	22,679	29,901	12,747
Total excluding Sanitary Waste	124,181	65,757	114,298	97,206	341,608
Sanitary	26,222	16,010	103,027	74,982	83,481
Grand Total	150,403	81,767	217,325	172,188	425,089

- From 1996 to 1997, low-level radioactive waste generated from cleanup/stabilization activities increased due to contaminated soil removal and disposal at the Hanford Site, and two environmental restoration projects with large soil excavations at the Mound Plant.
- Sanitary waste increased due to decommissioning activities at the Idaho National Engineering and Environmental Laboratory, and increased excavation at the Oak Ridge Y-12 Plant's Lower East Fork Poplar Creek.

Additional Analysis

Indicator

22. Integrated Safety Management System Implementation Status

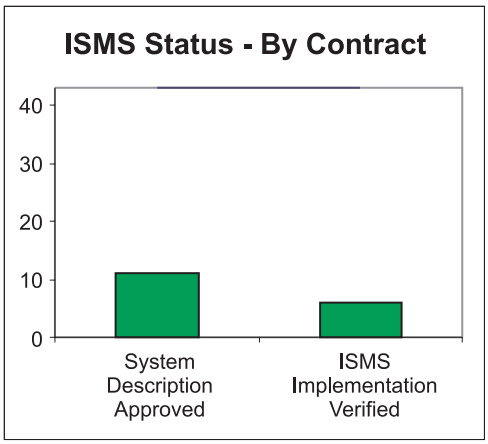
Definition

Integrated Safety Management (ISM) addresses the systematic process of ensuring the integration of all elements of environment, safety, and health (ES&H) into one ES&H system, with a focus on accomplishing work safely. All DOE sites are to have verified ISM systems in place by September 2000.

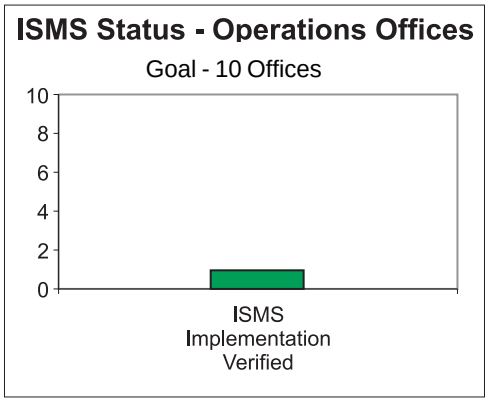
For the purpose of this PI, ISMS implementation will be tracked throughout the Department of Energy complex by "Contract" and by "Operations Office", rather than by site. Some sites may have more than one contract, with several facilities applicable to a given contract. To track by Contract, 41 data points were established, with each data point representing one contract; in addition, two Government-Owned Government-Operated (GOGO) facilities are being tracked for a total of 43 data points. It is recognized that contracts may not be equal in complexity and level of effort based on the number, nature of hazards, and type of facilities involved. For a more detailed tracking of site/facilities implementation, refer to: http://www.eh.doe.gov/ism/scheds/10_FACLST.pdf

For each contract, two items will be tracked and reported. These items are "System Description Approved" and "ISMS Implementation Verified." The Systems Description Approved column on the "ISMS Status – By Contract" chart, implies that a respective contractor has submitted a description of its safety management system that conforms to the guidance on preparation and content provided to them, and has been approved by the DOE Approval Authority. The ISMS Implementation Verified column on the same chart, implies that the contractor's safety management system conforms to the requirements of the approved ISMS description that was submitted, and has been verified as such. For Operations Office tracking, shown on the "ISMS Status – Operations" chart, only the "ISMS Implementation Verified" will be tracked since Operations Offices are not required to submit "System Descriptions" for approval.

In the case of a contract in which several facilities are involved, the respective contract would not be shown as having its "ISMS Description" approved, or its "ISMS Implementation Verified" until all applicable facilities have achieved their respective "approval" and verification "completed."



Source: DOE Safety Management Implementation Team



Source: DOE Safety Management Implementation Team

Key Observations

- Of the 10 “Priority Facilities” identified by DOE in its ISMS implementation plan, six have implemented their ISMS. For the four remaining, two are scheduled for implementation in the first quarter of 1999, one the second quarter, and one the third quarter.

The Secretary's Commitments to the President in EQ and ES&H (for FY98)

Environmental Quality (EQ) and Environment, Safety, and Health (ES&H) commitments as part of the Secretary of Energy's Performance Agreement with the President for Fiscal Year 1998 are summarized below.

More information related to the status of these commitments can be obtained from DOE's Office of Policy or via the World Wide Web at: http://www.doe.gov/policy/library/sol98/goals_eq.htm. Status is defined as follows:

Fully Successful – meeting or exceeding target
Successful – effectively meeting 80-100% of target
Partially Successful – effectively meeting 50-80% of target
Unsuccessful – effectively meeting less than 50% of target

Environmental Quality (FY98)

Aggressively clean up the environmental legacy of nuclear weapons and civilian nuclear research and development programs, minimize future waste generation, safely manage nuclear materials, and permanently dispose of the Nation's radioactive wastes.

Our Commitments

EQ1: Reduce the most serious risks from the environmental legacy of the U.S. nuclear weapons complex first.

STATUS: Partially Successful

EQ1-1 ***Reducing Worker, Public, and Environmental Risks***

Identify and fund projects to reduce the most serious risks first and prevent further increases in relative risk at all sites. **(EM)**

Success will be measured in FY 1998 by:

- *Stabilizing and safely storing about 3.7 metric tons of heavy metal of spent nuclear fuel (SNF). [Note: SNF data excludes information that is controlled or classified.]*
- *Stabilizing approximately 20,000 kilograms of bulk plutonium residue and approximately 7,000 liters of plutonium solution, and safely storing stabilized material.*
- *Closing one high-level waste storage tank at the Savannah River Site.*

EQ2: Clean up as many as possible of the Department's 53 remaining contaminated geographic sites by 2006.

STATUS: Successful

EQ2-1 ***Accelerate and Complete Geographic Site Cleanup***

Clean up as many as possible of the Department's 53 remaining contaminated geographic sites by 2006. Accelerate and complete cleanup of 9 large geographic sites by 2006, including the Fernald Environmental Management Project, Mound Plant, Rocky Flats Environmental Technology Site, Portsmouth Gaseous Diffusion

Plant, West Valley Site, Weldon Spring Site, Brookhaven National Laboratory, and Lawrence Livermore National Laboratory (Main Site and Site 300).

Cleanup 34 of the remaining 36 smaller geographic sites by 2006, including the Uranium Mill Tailings Remedial Action (UMTRA) Project.

Accelerate cleanup at the remaining 7 large sites (Hanford, Savannah River, Idaho, Oak Ridge Reservation, Los Alamos National Laboratory, Nevada Test Site, and Paducah) where overall completion will not be achieved by 2006, and ramp up disposal operations at the Waste Isolation Pilot Plant (WIPP) to facilitate this accelerated clean-up.

Remediation progress will be measured by completion of release sites (i.e., discrete areas of contamination) and facilities (i.e., contaminated structures) that will ultimately lead to the completion of the entire geographic site. **(EM)**

Success will be measured in FY 1998 by:

- *Completing remediation at 6 geographic sites. This will bring the total number of completed geographic sites to 66 out of a total of 113 contaminated geographic sites.*
- *Making progress on release site completion:*
  - *Completing about 575 release site assessments.*
  - *Completing about 280 release site cleanups. This will bring the number of completed release site cleanups to approximately 4,130 out of a total inventory of about 9,300 release sites.*
- *Making progress on facility decommissionings:*
  - *Completing about 90 facility decommissioning assessments.*
  - *Completing about 70 facility decommissionings. This will bring the number of completed facility decommissionings to approximately 520 out of a total inventory of about 2,950 facilities.*

EQ3: Safely and expeditiously dispose of waste generated by nuclear weapons and civilian nuclear research and development programs and make defense high-level radioactive wastes disposal-ready.

EQ3-1 *Opening the Waste Isolation Pilot Plant*

STATUS: Partially Successful

Declare the Waste Isolation Pilot Plant (WIPP) geologic repository open for disposal of transuranic wastes in May 1998 (subject to regulatory approval) and maximize timely shipment of waste from DOE sites. **(EM)**

Success will be measured in FY 1998 by shipping between 388 and 592 cubic meters of transuranic (TRU) waste to WIPP for disposal from three DOE sites (Los Alamos National Laboratory, Rocky Flats Environmental Technology Site, and Idaho National Engineering and Environmental Laboratory).

EQ3-2 *Making Disposal Ready and Disposing of Waste Generated During Past and Current DOE Activities*

STATUS: Fully Successful

Safely and expeditiously make disposal-ready and dispose of waste generated during past and current DOE activities. **(EM)**

Success will be measured in FY 1998 by:

- *Disposing of about 4,000 cubic meters of mixed low-level waste (MLLW).*
- *Disposing of about 30,000 cubic meters of low-level waste (LLW).*
- *Producing 200 canisters of high-level waste (HLW) at the Defense Waste Processing Facility (DWPF) at the Savannah River Site.*
- *Producing approximately 88 canisters of HLW at the West Valley Demonstration Project.*

EQ-4 Prevent future pollution.

STATUS: Fully Successful

EQ4-1 *Preventing Future Pollution*

Incorporate pollution prevention, including waste minimization, recycling, and reuse of materials, into all DOE activities. **(EM, DP, NE, ER)**

Success will be measured in FY 1998 by:

- *Reducing routine waste generation by 40 percent compared with 1993 waste generation rates. [Data for reporting will be available at the end of calendar year 1998]* **(EM)**
- *Reducing/avoiding the generation of radioactive, mixed, and hazardous wastes by about 4,000 cubic meters. [Data for reporting will be available at the end of calendar year 1998]* **(EM)**

EQ5: Dispose of high-level radioactive waste and spent nuclear fuel in accordance with the Nuclear Waste Policy Act as amended.

STATUS: Fully Successful

EQ5-1 *Continuing with Yucca Mountain Site Characterization*

Complete the scientific and technical analyses of the Yucca Mountain site, and if it is determined to be suitable for a geologic repository, obtain a license from the Nuclear Regulatory Commission. **(RW)**

Success will be measured in FY 1998 by completing the viability assessment analyses for licensing and constructing a geologic repository at the Yucca Mountain site. The assessment will consist of four key components:

- *A design and operational concept of the repository;*
- *An assessment of the performance of that concept in the geologic setting;*
- *A plan and cost estimate to construct and operate the repository; and*
- *A plan and an estimate of the costs to complete a license application.*

STATUS: Fully Successful

EQ5-2 *Developing Waste Acceptance and Transportation Capability*

Maintain the capability to respond to potential statutory direction that may include transportation of spent nuclear fuel and high-level waste to a designated interim storage facility. **(RW)**

Success will be measured in FY 1998 by:

- *Completing generic, non-site-specific interim storage facility work and addressing long lead-time issues related to storage of waste including design, engineering, and safety analyses.*
- *Developing a market-driven approach that uses private sector management and operational capabilities to provide waste acceptance and transportation services. Issuing a revised draft request for proposals.*
- *Completing a revised Policy and Procedure for implementation of Section 180(c) of the Nuclear Waste Policy Act.*

EQ-6 Reduce the life-cycle costs of environmental cleanup.

EQ6-1 *Reducing Environmental Cleanup Costs through Enhanced Performance*

STATUS: Successful

Significantly enhance performance, increase efficiency, and reduce costs through increased use of fixed-price competitive contracting, optimized project sequencing, recycling, and other waste minimization techniques, privatization, systems engineering, and benchmarking. **(EM)**

Success will be measured in FY 1998 by

- *Achieving productivity enhancement targets (Targets to be established as part of the Accelerating Clean-up: Focus on 2006).*
- *Increasing the dollar value and/or number of competitively awarded fixed-price contracts, including privatization contracts. Continuing the development of the privatization strategy by:*
  - — *Awarding the Oak Ridge Transuranic Waste Treatment Privatization contract;*
  - — *Authorizing commencement of the Tank Waste Remediation System (TWRS) contract Phase 1B at Hanford Site in Washington; and*
  - — *Awarding the Carlsbad Area Office Contact-Handled Transuranic Waste Transportation Privatization Contract.*

EQ6-2 *Developing and Deploying Innovative Cleanup Technologies*

STATUS: Fully Successful

Develop and deploy innovative environmental cleanup, nuclear waste, and spent fuel treatment technologies that reduce cost, resolve currently intractable problems, and/or are more protective of workers and the environment. **(EM)**

Success will be measured in FY 1998 by:

- *Accomplishing 49 innovative technology deployments.*
- *Demonstrating 35 alternative technology systems that meet the performance-specification based needs as identified by the Site Technology Coordinating Groups (STCGs).*
- *Making 40 alternative technology systems available for implementation with full cost and engineering performance data.*
- *Completing the final Programmatic Environmental Impact Statement for selecting the long-term management strategy for the depleted UF_6.* **(NE)**

STATUS: Fully Successful

EQ6-3 *Completing Deactivation of Surplus Facilities*

Reduce operating costs by completing deactivation of surplus facilities and placing them in a safe and environmentally sound condition, requiring minimal surveillance and maintenance. **(EM)**

Success will be measured in FY 1998 by completing about 60 surplus facility deactivations.

EQ-7 Maximize the beneficial reuse of land and effectively control risks from residual contamination.

STATUS: Successful

EQ7-1 *Making DOE Lands and Facilities Available for Other Uses*

In conjunction with stakeholders, develop comprehensive land use plans for DOE sites that provide information on alternative uses, ownership, environmental requirements, and implementation schedules. **(FM)**

Success will be measured in FY 1998 by:

- *Submitting to Congress a future use plan for DOE sites, and an analysis of related long-term stewardship issues by October 1998. The plan and analysis will include the Hanford Site, Savannah River Site, Rocky Flats Environmental Technology Site, and Idaho National Engineering and Environmental Laboratory.* **(EM)**
- *Initiating mission justification analysis and providing a schedule for reporting on the amount of excess land and facilities at each site by July 30, 1998.*

Environment, Safety, and Health

The mission of the Office of Environment, Safety, and Health is to develop innovative, unique, and cost-effective approaches for the protection of Department of Energy workers, the public, and the environment.

Our Commitments

STATUS: Fully Successful

CM1-1 *Instituting a Sound ES&H Culture*

Integrate and embed risk-based outcome oriented environment, safety, and health (ES&H) management practices into the performance of DOE's day-to-day work. **(EH)**

Success will be measured in FY 1998 by:

- *Preventing fatalities, serious accidents, and environmental releases at Departmental sites.*
- *Initiating Integrated Safety Management Systems at all 10 high priority facilities by April 1998.*
- *Completing documentation of ES&H roles and responsibilities for all appropriate DOE offices and sites by July 1998.*
- *Publishing guidance for incorporating environmental justice principles into the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) implementation process. (EH/ED)*
- *Through independent oversight, provide information and analysis of the*

effectiveness, vulnerabilities, and trends of the Department's environment, safety, health, and safeguards and security policies and programs to the Secretary and senior line management

- *Completing an additional four needs assessments to continue building the basis for a more detailed program of medical surveillance, in order to address the health risks to former DOE workers.*

CM1-2 *Ensuring DOE Programs Appropriately Address ES&H Priorities*

STATUS: Fully Successful

Clearly identify and fund ES&H priorities and ensure resources are appropriately spent on those priorities. **(EH)**

Success will be measured in FY 1998 by beginning to annually monitor and report on ES&H expenditures and improve related internal controls.

CM1-4 *Investigating Feasibility of Independent External Oversight of Safety and Health at DOE Sites*

STATUS: Fully Successful

Work with the Nuclear Regulatory Commission and the Occupational Safety and Health Administration to evaluate the costs and benefits of independent external regulation of safety and health. **(EH)**

Success will be measured in FY 1998 by conducting three NRC/DOE pilot projects to assess the DOE facilities against the standards that NRC believes would be appropriate to ensure radiological safety.

Relationship to DOE Strategic Plan Goals

Establish Priorities & Eliminate Hazards

Performance Requirements

DOE STRATEGIC PLAN (September 1997)	PERFORMANCE INDICATORS
DOE's Four Businesses: **Environmental Quality** *How we will reduce the environmental, safety, and health risks and threats from DOE facilities and materials, safely and permanently dispose of civilian spent nuclear fuel and defense related radioactive waste, and develop the technologies and institutions required for solving domestic and international environmental problems.* **Environmental Quality:** **Objective 3** *Safely and expeditiously dispose of waste generated by nuclear weapons and civilian nuclear research and development programs and make defense high-level radioactive waste disposal-ready*	1. Total Recordable Case Rate 2. Occupational Safety and Health Cost Index 3. Electrical Safety 4. Industrial Operations Safety 5. Chemical Hazard Events 6. Reportable Occurrences of Releases to the Environment 7. Cited Environmental Violations 8. Environmental Permit Exceedances 9. Radiation Dose to the Public 10. Worker Radiation Dose 11. Radiological Events 18. Price-Anderson Amendments Act Enforcement 19. Spent Nuclear Fuel and Plutonium Vulnerabilities Resolved 20. HEU Vulnerabilities Resolved 21. Waste Generation
Corporate Management: **Environment, Safety, and Health** *How we will ensure the safety and health of workers and the public, and protect and restore the environment.* **Corporate Management:** **Objective 1** *Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities.*	1. Total Recordable Case Rate 2. Occupational Safety and Health Cost Index 3. Electrical Safety 4. Industrial Operations Safety 7. Cited Environmental Violations 8. Environmental Permit Exceedances 9. Radiation Dose to the Public 10. Worker Radiation Dose 11. Radiological Events 12. Near Misses and Safety Concerns 13. Inadequate Procedures/Procedures Not Followed 16. Environmental Compliance Milestones Met 17. Open DNFSB Recommendations 22. Integrated Safety Management System Implementation Status

This page intentionally left blank.

Summary of Process

B1. Overview

One of the critical success factors identified in the Department of Energy's (DOE) Strategic Plan for environment, safety and health is, "how will we ensure the safety and health of workers and the public, and protect and restore the environment." This report describes a new approach for measuring the performance of DOE operations in these areas and thereby supporting management decisions aimed at "ensuring the safety." The general concept is to focus on key factors with the most impact on worker and facility safety and the environment.

Data collection was limited to available data (e.g., ORPS, CAIRS, Site Environmental Reports). The process was non-intrusive and did not expend site resources. As such, the performance indicator components may not sufficiently measure all facets of environment, safety and health. Experience from this report, along with customer feedback from the attached survey form, will be evaluated.

This report was reviewed by a multi-disciplinary team with expertise in nuclear and facility safety, environment, worker safety and health, health studies, and planning/administration. The team is identified at the end of this appendix.

B1.1 Initial Performance Indicators

The performance indicators included in this report are identified in the following table. Selection of the indicators involved both evaluation of the overall safety significance as well as tests of availability. A process was established where all potential indicators were evaluated with respect to significance to the ultimate goal of measuring performance in environment, safety and health. With respect to availability, a decision was made to select indicators from existing data streams to avoid, for now, levying a burden on field activities for additional data. Primarily, indicators are derived from data within four data systems and one annual report:

- *Occurrence Reporting and Processing System (ORPS)*—A system originally designed for notification of nuclear as well as non-nuclear occurrences in the field. For all indicators based on occurrence reports, data prior to 93Q1 has been removed from the graphs and analysis.

- *Computerized Accident/Incident Reporting System (CAIRS)*—A system for collecting data associated with occupational injury and illness events and statistics.

- *Radiation Exposure Monitoring System (REMS)*—A system for collecting data on individual radiation doses received by DOE complex workers.

- *Environmental Compliance Database*—A system maintained by the Office of Environmental Policy and Assistance.

- *Annual Site Environmental Reports*

There are, of course, limitations resulting from using the data for other than the purpose for which it was collected. Furthermore, the availability of data should not be confused with relevance to measuring performance. Indicators should be selected based on their impact on the operations being examined, not solely because the data exist. Although some of the selected indicators may be of interest to other audiences, it is likely that other valid indicators exist that should be analyzed and trended to provide the appropriate perspective (e.g., facility, contractor, program management) on performance.

PI Component	Data Source
I. Accidents/Events	
1. Total Recordable Case Rate	Computerized Accident/Incident Reporting System/ EH-51
2. Occupational Safety and Health Cost Index	Computerized Accident/Incident Reporting System/ EH-51
3. Electrical Safety	Review of Occurrence Reports, EH-33 Field Office Contacts
4. Industrial Operations Safety	Review of Occurrence Reports, EH-33 Field Office Contacts
5. Chemical Hazard Events	Quarterly Review of Chemical Safety Concerns/ Occurrence Reporting and Processing System, EH-52/EH-53/BNL
6. Reportable Occurrences of Releases to the Environment	Review of Occurrence Reports, EH-33
7. Cited Environmental Violations	Environmental Compliance Tracking Database, EH-41
8. Environmental Permit Exceedances	Annual Site Environmental Reports, EH-41
9. Radiation Dose to the Public	Annual Reports to Environmental Protection Agency (EPA) by Each Site, EH-41
10. Worker Radiation Dose	Radiation Exposure Monitoring System (REMS), EH-52
11. Radiological Events	Review of Occurrence Reports, EH-33
II. Precursors	
12. Near Misses and Safety Concerns	Review of Occurrence Reports, EH-33
13. Inadequate Procedures/Procedures Not Followed	Review of Occurrence Reports, EH-33
14. Safety System Actuations	Review of Occurrence Reports, EH-33
15. Safety Equipment Degradation	Review of Occurrence Reports, EH-33, Field Office Contacts
III. ES&H Management	
16. Environmental Compliance Milestones Met	EM Progress Tracking System (PTS), EH-41
17. Open DNFSB Recommendations	Safety Issues Management System (SIMS), S-3.1
18. Price-Anderson Amendments Act Enforcement	Office of Enforcement and Investigation Database, EH-10
22. ISMS Implementation Status	DOE Safety Management Implementation Team
IV. Hazards	
19. Spent Nuclear Fuel and Plutonium Vulnerabilities Resolved	Plutonium Vulnerability Management Summary Report, EM-66; Reports on Status of Corrective Actions to Resolve Spent Nuclear Fuel Vulnerabilities, EM-67
20. HEU Vulnerabilities Resolved	Office of Site Operations, DP-24 Highly Enriched Uranium ES&H Vulnerabilities Status Report, RFFO Field Office Contacts
21. Waste Generation	Waste Minimization Reporting System, EH-41

B2. Data Analysis–Analyses Performed

The data analysis results are summarized in the DOE Performance Indicator Report. They are intended to identify areas which should be further investigated (to identify areas that may require intervention as well as good practices to share across DOE); they do not provide absolute answers in themselves. Data analyses include:

- Looking for statistically significant trends over time,
- Comparison to historical averages or benchmarks (e.g., Bureau of Labor Statistics for similar industries),
- Normalization of events to opportunities (e.g., construction related events divided by construction hours worked or construction dollars spent),
- Examination for statistically significant trends in types of operations, severity or type of events, and causes.

Typically, the historical baseline is established using existing data excluding the most recent quarter. Where possible, data were analyzed by quarter. In some cases, data were also viewed monthly to reveal any interesting seasonal effects not evident in the quarterly data grouping. Where appropriate, sites were contacted to provide perspective for unusual data values or trends. Data sources for several of these measures are annual; the need for more frequent data must be evaluated for future reports.

The data can also be used to perform other special analyses and reports (such as trends in causes and types of events). These analyses and reports could support special needs, such as oversight preparation and programmatic reviews. Root cause data is analyzed based on information from the preceding quater as there is an inherent time lag between event notification and final identification of a root cause. To capture the maximum number of root causes for analysis purposes, the preceding quarter is examined.

B3 – Significance Analysis

The application of significance ranking in the context of performance indicators can be used to aid DOE and contractor management in determining where they need to apply resources to mitigate hazards or to improve safety. It is anticipated that as experience is gained, significance ranking will be applied to other performance indicators.

Significance of events is assigned in accordance with Table 1, EH-33 Performance Indicator Significance Criteria, in Appendix B-3 of this report. The table was developed for use with the PI report with input from various significance ranking models, including Savannah River's Significance Categories Matrix, Hanford's Priority Planning Grid, and from limits provided by various DOE Orders.

There are four significance rankings – Level 1 through 4 – with Level 1 being the most significant and Level 4 the least. Generic criteria for areas such as worker and public safety are combined with PI-specific criteria (i.e., Electrical Safety) to rank the significance of events. For example, a minor event that would be ranked as Level 4 (least significant) under the generic criteria would, in accordance with the PI-specific criteria for Electrical Safety, be ranked as Level 3 if an electrical shock was involved. For cases where there is no PI-specific criteria, the generic criteria are used.

It is expected that more PI-specific criteria will be developed as experience is gained with the current system and based on feedback from readers of this report.

Table 1 - EH-33 Performance Indicator Significance Criteria

Worker Safety	Level 1	Level 2	Level 3	Level 4
	Loss of life			
	Permanent disability			
	Injury with >30 days of lost work time	Injury with hospitalization or lost work time	Injury requiring medical treatment	Minor injury - no treatment, no lost work days
Public Safety	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	Offsite exposure near or above limits, moderate injuries	Low-level radiation or chemical exposure	Minor injury	Public inconvenience
Environmental	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	Major on-site environmental damange with cleanup costs >$5M	On-site environmental damage with cleanup costs >$500K	On-site environmental damage with cleanup costs >$250K	Reportable release with minor or no impact
	Off-site environmental damage with significant cleanup costs	On-site environmental damage with minor cleanup costs	Release to environment that exceed regulatory limits	
Facility Safety	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	Willful management disregard or direction to staff to disregard safety requirements, policies, or procedures	Widespread failure or lack of one or more facility safety programs	Findings indicating major deficiency or lack of compliance with safety documents	Administrative or isolated non-compliance
		Unreviewed Safety Question	OSR / Tech Spec violation	
		Major loss of configuration control in nuclear facility	Technical analysis cannot support conclusions needed for compliance document	
		DOE authorization required for startup or restart	Failure of corrective action to prevent recurrence	
External Compliance	**Level 1**	**Level 2**	**Level 3**	**Level 4**
	Willful violation of federal, state, or local laws or regulations	Several instances of non-compliance that indicate major deficiency or lack of a compliance program	Isolated or single noncompliance	Administrative or isolated non-compliance
Cost / Schedule	**Level 1**	**Level 2**	**Level 3**	**Level 4**
Cost	>$5M	>$1M	>$250K	>$100K
Schedule	Significant project delay		Minor project delay	Failure to meet milestone
Electrical Safety	**Level 1**	**Level 2**	**Level 3**	**Level 4**
			Electrical Shock, RF burn	
			Contact with energized equipment that should have been de-energized	

Authors

US DOE, Office of Environment, Safety and Health

Richard Day, Office of Operating Experience Analysis and Feedback, EH-33

Steven Woodbury, Office of Environmental Policy and Assistance, EH-41

Janet Macon, Office of Occupational Safety and Health Policy, EH-51

Frank Cicchetto, Office of Operating Experience Analysis and Feedback, EH-33/Parallax, Inc.

Todd Lapointe, Office of Operating Experience Analysis and Feedback, EH-33/ Parallax, Inc.

Kenneth Malnar, Office of Operating Experience Analysis and Feedback, EH-33/Parallax, Inc.

Keith Currin, Office of Operating Experience Analysis and Feedback, EH-33/Parallax, Inc.

Contributors

US DOE, Office of Environment, Safety and Health

Ken Duvall, Office of Environmental Policy and Assistance, Air, Water and Radiation Division, EH-412

Nirmala Rao, Office of Worker Protection Programs and Hazards Management, EH-52

Helen Todosow, Brookhaven National Laboratory

Joe Arango, Office of the Departmental Representative to the DNFSB, S-3.1

David Compton, Office of the Departmental Representative to the DNFSB, S-3.1/Vista Technology Corp.

Sue Petersen, Office of Enforcement and Investigation, EH-10

Hoyt Johnson, Office of Nuclear Material Stabilization, EM-66

Howard Eckert, Spent Fuel Management Office, EM-67

Pamela Curry, Office of Operating Experience Analysis and Feedback, EH-33/Parallax, Inc.

Reviewers

US DOE, Office of Environment, Safety and Health

Tom Rollow, Office of Operating Experience Analysis and Feedback, EH-33

Earl Hughes, Office of Operating Experience Analysis and Feedback, EH-33

John Abeles, Office of Operating Experience Analysis and Feedback, EH-33/ Parallax, Inc.

Glossary

Baselines

Baselines provide an historical reference point used to show how the current period compares to past experience. Generally, historical baselines are established using existing data excluding the most recent reporting period. For the data that originates from CAIRS, the two most recent quarters are excluded to account for the lag in data reporting. Baselines established for data originating from occurrence reports are reevaluated each time the governing reporting order changes.

Causes of Occurrences

Causes of occurrences are determined by performing event investigations and may be identified as direct, contributing, or root causes.

- Direct Cause: The cause that directly resulted in the occurrence.
- Contributing Causes: The cause(s) that contributed to the occurrence, but by itself would not have caused the occurrence.
- Root Cause: The cause that, if corrected, would prevent recurrence of this and similar occurrences.

Cause categories are selected from the following:

1. Equipment/material problem: An event or condition resulting from the failure, malfunction, or deterioration of equipment or parts, including instruments or material.
2. Procedure problem: An event or condition that can be traced to the lack of a procedure, an error in a procedure, or procedural deficiency or inadequacy.
3. Personnel error: An event or condition due to an error, mistake or oversight. Personnel errors include inattention to details of the task, procedures not used or used incorrectly, communication problems, and other human errors.
4. Design problem: An event or condition that can be traced to a defect in design or other factors related to configuration, engineering, layout, tolerances, calculations, etc.
5. Training deficiency: An event or condition that can be traced to a lack of training or insufficient training to enable a person to perform a desired task adequately.
6. Management problem: An event or condition that can be directly traced to managerial actions or methods. Management problems include inadequate administrative control, work organization/planning deficiency, inadequate supervision, improper resource allocation, policies not adequately defined, disseminated or enforced,

Cost Index Formula

The Cost Index is computed as follows:

Cost Index = 100 [(1,000,000) * D + (500,000) * T + (2,000) * LWC
+ (1,000) * WDL + (400) * WDLR + (2,000) * NFC] / HRS

where

D = the number of fatalities,

T = the number of permanent transfers or terminations due to occupational illness or injury,

LWC = the number of lost workday cases,

WDL = the number of days away from work

WDLR = the number of restricted workdays,

NFC = the number of non-fatal cases without days away from work or restricted workdays, and

HRS = the total hours worked.

Facility Function

Facility function identifies the type of facility or the activity/function performed by the facility. Possible facility functions are listed below.

- Plutonium Processing and Handling
- Special Nuclear Materials Storage
- Explosive
- Uranium Enrichment
- Uranium Conversion/Processing and Handling
- Irradiated Fissile Material Storage
- Reprocessing
- Nuclear Waste Operations
- Tritium Activities
- Fusion Activities
- Environmental Restoration Operations
- Category “A” Reactors
- Category “B” Reactors
- Solar Activities
- Fossil and Petroleum Reserves
- Accelerators
- Balance-of-Plant (e.g., offices, machine shops, site/outside utilities, safeguards/security, and transportation)

The following terms are related to occurrence reporting, as required by DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.

Occurrence Categories (Types of Occurrences)

Occurrence categories are arranged into 10 generic groups related to DOE operations and include the following:

1. Facility Condition
2. Environmental
3. Personnel Safety
4. Personnel Radiation Protection
5. Safeguards and Security
6. Transportation
7. Value Basis Reporting
8. Facility Status
9. Nuclear Explosive Safety
10. Cross-Category Items

Price-Anderson Amendments Act (PAAA)

Price-Anderson Amendments Act (PAAA). The 1988 Price-Anderson Amendments Act extended indemnification to DOE operating contractors for consequences of a nuclear incident. At the same time, Congress required DOE to begin undertaking enforcement actions against those contractors who violate nuclear safety rules. The regulatory basis for the enforcement program is published in 10CFR820, Procedural Rules for DOE Nuclear Activities. Enforcement actions may include the issuance of Notices of Violations and, where appropriate, civil monetary penalties of up to $100,000 per violation per day. The mechanism allows DOE to penalize a contractor for unsafe actions or conditions while providing positive incentives for contractors to strive for an enhanced nuclear safety culture through attention to compliance to standards and requirements, self-identification of problems, reporting noncompliance's to DOE and initiating timely and effective corrective actions.

Severity of Occurrence

Severity of occurrence indicates the degree of significance associated with the different types of occurrences.

- Unusual Occurrence: A non-emergency occurrence that exceeds the Off-Normal Occurrence threshold criteria; is related to safety, environment, health, security, or operations; and requires immediate notification to DOE.
- Off-Normal Occurrence: Abnormal or unplanned event or condition that adversely affects, potentially affects, or is indicative of degradation in the safety, safeguards and security, environmental or health protection, performance, or operation of a facility.

Statistical Process Control (SPC)

Statistical Process Control (SPC) is the application of statistical techniques to control a process.

Total Effective Dose Equivalent (TEDE)

TEDE = External Dose Contribution + Internal Dose Contribution. Prior to 1993, the method for calculating the internal dose contribution changed from an annual internal dose to a dose committed over 50 years. Although one may expect this change would result in higher reported doses, the elimination of the "legacy" doses from previous years' exposures resulted in lower reported doses.

Product Improvement Survey Form

Purpose of the Product - The Office of Operating Experience Analysis and Feedback, EH-33, developed this set of indicators for measuring the performance of DOE operations in the areas of Worker Safety and Health and the Environment. The indicators are intended to measure the Department's success in it strategic goal to manage and improve its environmental, safety, and health (ES&H) performance. The major customers for these indicators are expected to be the senior leadership of DOE.

In order to assess the effectiveness of this performance indicator report, we would appreciate your assistance by providing responses to the following (check one):

1. Do you use indicators to measure performance? ☐ Yes ☐ No
2. Do you feel that improved methods for measuring performance are needed? ☐ Yes ☐ No
3. Would you make management decisions based on this kind of information? ☐ Yes ☐ No
4. Does DOE-wide ES&H performance matter to you? ☐ Yes ☐ No
5. What are your information needs with regard to measuring Department-wide ES&H success:

   ☐ Moderate detail concerning the Department ES&H success
   ☐ Light detail concerning the Department ES&H success
   ☐ Quickpulse of the Department ES&H success
   ☐ I have no need for the information on a regular basis

Report Evaluation - From your review of this report, ***and in consideration of the purpose stated above***, mark the number that most closely corresponds to your reaction to the following statements.

	Strongly Agree			***Neutral***			***Strongly Disagree***
6. The performance indicators are relevant to the measurement of overall DOE ES&H performance.	⑦	⑥	⑤	④	③	②	①
7. The report layout (text and graphics) is logical and easy to understand.	⑦	⑥	⑤	④	③	②	①
8. The data presented in this report are consistent with my impressions of DOE's ES&H performance.	⑦	⑥	⑤	④	③	②	①
9. The performance indicators provide a "balanced" view (e.g., successes and problems) of DOE's ES&H performance.	⑦	⑥	⑤	④	③	②	①
10. This report helps measure DOE's success in managing and improving its ES&H performance.	⑦	⑥	⑤	④	③	②	①
11. This report is useful in communicating information on DOE's ES&H performance to external customers.	⑦	⑥	⑤	④	③	②	①

12. Would you be willing to expend time/travel funds to participate in product improvement sessions? ☐ Yes ☐ No
13. Based upon your stated needs, does this report meet your expectations? ☐ Yes ☐ No

Please fax completed survey form to Samuel Rosenbloom, EH-33, at 301-903-2329

Mail or FAX to:

Tom Rollow (FOR) / **Samuel Rosenbloom** (270CC/GTN)
Office of Operating Experience Analysis, EH-33
U.S. Department of Energy
Washington, DC 20585

FAX Number: (301) 903-2329

Safety Management Through Analysis

Page 1 of _____

From:

Name: _____

Organization: _____

Phone: _____

Comments: What additional parameter(s) should be monitored and where could the data be obtained? Consider changes required to make this report more useful for your needs and specify any general observations based on your review. Use additional pages as necessary.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1998 433-460 / 60080